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CONTENTS

PAGE

The Editor's Comments
by H. B. Cronshaw, B.A., Ph.D., A.I.C. . . 263

What are Caramels?
by R. Harold Morgan, M.Sc. 267

Confectioners' Glucose and Dextrose . . . 270

Honey Packing 271

Sugar Drying
by A. G. Arend 274

The Manufacture of Malt Extract. Part II.
by Thomas McLachlan, A.C.G.F.C., F.I.C. . 275

Soya Flour
by A. A. Horvath 279

Butter Factory at Battersea 282

Sausage Rusks
by E. B. Bennion, M.Sc. 283

New Light on Mould Growth 286

The Training of the Food Technologist
by H. B. Cronshaw, B.A., Ph.D., A.I.C. . . 287

Industrial News 291

Information and Advice 295

Recent Patents 298

Recent Trade Marks 299

New Companies 300

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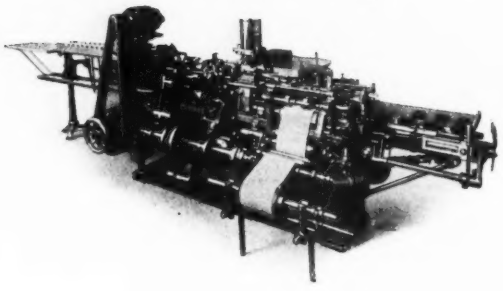

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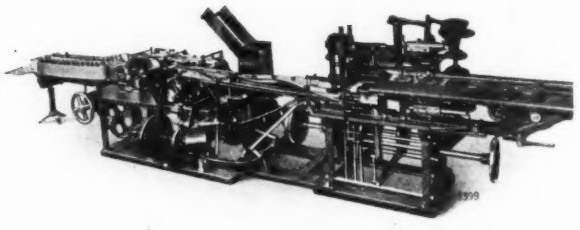

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FOOD MANUFACTURE

Vol. X, No. 8 August, 1935

Bread in France

FRENCHMEN ARE notoriously big bread eaters. We have on more than one occasion seen them voraciously devouring feet, if not yards, of bread. They have, however, discovered that post-war bread is not what it should be, and are beginning to protest violently against "the execrable concoction that looks like a loaf but acts like a brickbat inside them". During the war, rice, maize, and barley were substituted for wheat, and the loaf became smaller and poorer in quality. Now with a glut of wheat there appears to be no reason why substitution should be tolerated. Opinion has now become so strong, says the Paris correspondent of the *Lancet*, that an appeal has been made to the Academy of Medicine in the hope that that august body will find a way back to the palatable and digestible pre-war loaf. Some very startling indictments have been made by Dr. Henri Labbé in a communication to the Academy, and he urges that, apart from the disuse of substitutes, there should be a return to yeast and its slower rate of working instead of the more rapid acting ferments from molasses. He also condemns the mazout or crude oil preparation used in large amounts in French bakeries. He suggests the institution of the central bakery large enough to be staffed with three teams, each of which would work eight hours. A continuous 24-hour cycle would thus be created, and, so he hopes, "the bread will again become the healthy, economic, savoury, digestive, and energetic food to which our countrymen are accustomed by tradition."

Salt-free Casein Bread

It is very difficult to construct a salt-free diet with a high or even normal protein content because those foods that are rich in protein, such as meat, fish, cheese, eggs, and milk, are those which contain a relatively high percentage of sodium chloride. A salt-free bread containing ashless casein has proved to be extremely useful in these cases, and it is stated to be almost indistinguishable from home-made salt-free bread prepared entirely from flour. This bread is made from 640 gm. (22½ oz.) flour, 156 gm. (5½ oz.) ashless casein, 15 gm. (½ oz.) yeast, and 425 c.cm. (15 oz.) water, mixed and baked in the ordinary way. In this manner a bread is obtained containing 19·7 per cent. protein and 42·5 per cent. carbohydrate against the 7 per cent. and 47·4 per cent. respectively of ordinary bread.

Synthetic Milk

The above heading caught our eye in a recent paper by Widdowson and McCance on the use of purified casein in salt-free diets. Milk is generally forbidden when a patient is prescribed a strictly salt-free diet. The usual substitute is cream, but although this is quite satisfactory for many purposes, it has obvious disadvantages for young children. The authors of the paper referred to have now devised a synthetic milk containing practically no sodium chloride, and have used it both therapeutically and experimentally. It is relatively easy to make, and is claimed to be a fair substitute for natural milk. It is made from water, lactose, cream, ashless casein, and a salt mixture containing calcium, magnesium, potassium, iron, and phosphorus. Lactalbumen was not added on account of the difficulty of obtaining a salt-free specimen. Minute details for the preparation of the milk are given in the paper.

Variety of Uses

This synthetic milk may be used for most purposes for which cows' milk is generally employed. It may be used for infant feeding, and for this purpose it may be sweetened with cane sugar. More cream may be added if desired. It must be emphasised that no claim is made that the milk is a perfect food for a growing baby. As the authors point out, owing to the omission of lactalbumens,

it may be deficient in cystine, but a supplement of this protein could be added if a salt-free milk was to be the sole article of diet for a considerable time. For most purposes, however, this is unnecessary, since casein is admittedly a protein of high biological value. It should be noted that the synthetic milk contains no vitamin C. The cream supplies some vitamins A and D, but not enough for a growing child. It may be used in tea, and in coffee and cocoa it is quite indistinguishable from ordinary milk. It has been used for cooking with considerable success, and in rice pudding, blancmange, milk jelly, and powder custard the slight flavour of the casein cannot be detected. As to cost, it is calculated that half a litre (18 oz.) costs about 6d. (casein 1d., lactose 1d., cream 4d.), which is, of course, much dearer than cow's milk, but from a scientific point of view the product is very interesting.

Flour Improvers

The question of the advisability of adding improvers to flour is one that appears with clockwork regularity, and much has been written in condemnation of the practice. The latest contribution to the vexed question is a paper by J. von Darányi and St. von Vitéz (see *Analyst*, June, 1935, p. 421). These workers have carried out certain experiments on rats, mice, and dogs, using flour to which different improvers were added. The proportions used were 0·1 gm. sodium perborate, 3 gm. ammonium persulphate, and 1 gm. of benzoyl peroxide respectively to 5 kgm. of flour in the form of porridge and as bread. The results showed measurable retardation of growth and symptoms of disease. There was a marked falling off in body weight, and the symptoms of poisoning included excoriation and proliferation of the nose, together with much depilation.

While not doubting for a moment that these results were actually obtained, we would suggest that they were not due to the small amounts of chemicals added, but that in all probability the experimental diet was not balanced and that the animals were submitted to unnatural conditions. It is surprising that no experiments were carried out on acid calcium phosphate, which is probably the most widely used improver, and, incidentally, benzoyl peroxide is not an improver but a bleaching agent. Most of the flour made in this country has some treatment or other, and if the effects are so dire as suggested in this paper it is a wonder that any of us are alive to tell the tale!

Pasteurising Plants

In view of the activities of the Milk Marketing Board the question of pasteurisation of milk is very much in the limelight. One would have thought that the Order of 1923 (Milk. Special Designations) made the position clear. The definition of pasteurisation is simple—the main requirements being that the milk should be heated to 145° to 150° F. and maintained at that temperature for half an hour. In spite of the apparent simplicity of the problem there is no doubt that pasteurisation is frequently carried out inefficiently. In the report recently issued by the Cattle Diseases Committee of the Economic Advisory Council it is recommended that pasteurisation should only be permitted in plants of an approved design, which have been tested on erection and periodically inspected during working by an officer of the sanitary authority. So far the task of the officers of the local authority has been made difficult by the lack of information available about the appliances and processes of commercial pasteurisation. In order to give this information in concise form Sir Weldon Dalrymple-Champneys has prepared a Report on the Supervision of Milk Pasteurising Plants (Reports on Public Health and Medical Subjects No. 77). The Report refers to the common causes of failure to secure efficient pasteurisation, and in the 47 pages which follow the whole subject is dealt with in a clear and methodical manner. It should go a long way to clear up the hidden mysteries of this apparently simple problem.

Table Poultry

The Government have given home poultry producers some measure of assistance in the shape of import duties. They have now gone a step further by giving them advice on the production of table poultry. The Ministry of Agriculture has issued a bulletin dealing with experiments on the production of table poultry at the Southern Breeding Station at Wye, Kent. We have periodically made reference to this subject; thus in August, 1933, we discussed the booklet *Practical Poultry Feeding*, issued by the Millers' Mutual Association, and in December, 1933, we referred to the marketing of poultry. The booklet just issued by the Ministry of Agriculture brings the information right up to date.

The breeding station at Wye was established under the National Poultry Institute Scheme in 1925, and the experiments described cover the years 1925 to 1932. During this very considerable period special attention has been given to the problems

associated with the production of "Surrey" fowl. Various breeds and crosses were tried, and the food requirements in relation to the amount of flesh produced and the most suitable times and methods for marketing were investigated. Another problem that has received attention is the marketing of young cockerels from commercial egg farms. All these experiments are fully treated in the bulletin, and in the foreword the Ministry of Agriculture's Poultry Commissioner states that among other matters awaiting investigation are the relative value and practicability of "battery" methods as compared with more natural and extensive methods. The bulletin contains much of value to poultry breeders and to those of our readers interested in the subject we recommend its careful perusal. It is Bulletin No. 91 and costs one shilling.

The Transport of Food

At the present time when the problem of food transport occupies the attention of such a wide circle of technicians, it is interesting to note side by side the views of two eminent authorities on the subject as it applies to rail and sea.

The members of the Society of Chemical Industry who attended the Society's Annual Conference in Glasgow this month were fortunate in being able to hear two important papers dealing with the question during the Food Group's session on Wednesday, July 3. They were "Transport of Food by Sea", by Dr. A. J. M. Smith, who is a well-known research worker at the Low Temperature Research Station at Cambridge, and "Transport of Food by Rail", by Brig.-General Sir Harold Hartley, F.R.S., Vice-President of the London Midland and Scottish Railway Co., Ltd. Some of the points contained in the addresses will be dealt with in the next issue.

Darkening of Fruit

In connection with a note we published concerning the use, experimentally, by A. K. Balls (U.S. Department of Agriculture) of pineapple juice to replace sulphur dioxide in preventing the darkening of fruit, Professor Cruess and Mr. Joslyn of the Fruit Products Laboratory of the University of California inform us that exhaustive tests carried out by the staff of the Laboratory and by the staff of the California Dried Fruit Association definitely proved that the method is useless for apricots, peaches and pears, and of little use for apples. P. J. Quin in South Africa confirms these findings. There is as yet no substitute for sulphur dioxide.

We are extremely sorry to hear from Professor Cruess of Professor P. F. Nichols' death. This loss of one who was in charge of the dried fruit work at Berkeley and who was held in high esteem by the industry will be keenly felt by all.

Cheese Ripening

Discussing the biochemical aspects of cheese ripening at the Norwich meeting of the Food Group of the Society of Chemical Industry, Dr. J. G. Davis, of the National Institute for Research in Dairying, said that the most important primary factors in Cheddar ripening are the rennet enzymes and the lactic acid flora. Rennet has been found to contain at least four enzymes: (1) *Pepsin* acting on casein only at *p*H values below 4·6; (2) *rennet papainase* acting on casein at or near the isoelectric point (*p*H 4·6); (3) *rennet peptidase* having a sharp optimum at *p*H 6·2, and (4) the *clotting enzyme*, optimum *p*H 6·2.

Now since Cheddar during ripening varies in *p*H from 4·9 to about 5·6, it is evident that pepsin cannot be instrumental in causing proteolysis in the cheese. Probably the initial stages of protein breakdown are brought about by rennet papainase and the breakdown increases as the *p*H rises. The relative importance of the rennet enzymes and those of the lactic acid bacteria is still a matter of controversy. The enzymes in commercial rennet appear to vary in nature and proportions.

Wheat Prices

The Stanford University of California has been issuing Wheat Studies compiled by the Food Research Institute for a number of years. In view of the efforts to come to some international agreement in regard to wheat supplies the study published in April this year entitled "Spreads between Wheat Prices in England" is of considerable interest. The United Kingdom is the largest wheat import market in the world as well as being the biggest world sample market. The price of imported wheat covers a wide range and is dependent on type, variety, grade, and quality. The study under discussion states that millers' choices are various, and find expression in price differentials which vary from season to season. It is maintained that averages have little meaning as each world crop is a new trade experiment. In the last decade available figures indicate that Canadian wheat usually ruled at top price, with Argentine wheat on the bottom level. Australian wheat came in between, while Western European wheats were surprisingly con-

spicuous as low-priced imports. The hardest wheats were usually the highest priced, but the lowest priced ones were not the soft wheats, but atypical and nondescript varieties of either type.

Wheat Consumption

Another interesting study is that dealing with the "*Per Capita* Wheat Consumption in Western Europe". In it an effort has been made to estimate the quantities of wheat devoted respectively to food consumption, feed consumption, and seed use in thirteen Western European countries from about 1885 to the present time. The evidence adduced shows that food consumption of wheat is a very different proposition from the total consumption or utilisation of wheat. Non-food uses are very important in some countries, and these uses have greatly expanded since before the war in some countries but not in others. Recently feed use of wheat has been so heavy that, if governments chose to divert wheat from feed to food uses and if domestic wheat crops *per capita* should equal those of the period 1929-1933, the net imports into Western Europe in 1934-1938 might well be reduced by roughly 100 million bushels a year without reduction in the *per capita* food consumption of wheat. The estimates of food consumption of wheat suggest that the tendency is not for wheat completely to displace rye (as is commonly believed), but for a balance to be struck between the consumption of these two cereals.

Brining Vegetables

There is, at present, much talk about land settlement, and there is also some prospect of a considerable reduction of the acreage now devoted to sugar beet. It is very evident that in these changing circumstances consideration will have to be devoted to the question of which crops will be most profitable for the land settlers to grow and which will replace sugar beet economically. Recently we noticed a letter in *The Times* dealing with the problem of home-grown vegetables. It has been stated that the trouble is not one of under production but lack of demand. There is a great possibility for a considerable increase in the consumption of home-grown vegetables in the brining industry. At present we import nearly 95 per cent. of the onions consumed in this country, and practically all the vegetables used for brining. We would suggest that those in charge of the land settlement scheme should concentrate on the production of these and guarantee an adequate production. The Government should give reasonable protection from foreign dumping, say, in the shape of 33⅓ per cent. duty on all onions and brining vegetables. In this way the holdings could be turned into profitable undertakings. The consumer need not fear higher prices. In the last year or so the home production of flowers and certain vegetables has been encouraged by a protective tariff and the price has not risen, but is all the time showing a falling tendency.

Apple Juice

H. D. Poore, of the Los Angeles Laboratory of Fruit and Vegetable Chemistry, U.S. Bureau of Chemistry and Soils, has recently carried out extensive experimental work on the production of apple juices, concentrates, and syrups.

In the case of the juice, various methods of preservation have been tried out, including freezing, pasteurising, germ-proof filtering, and carbonating, the juice having been obtained from ten varieties of Washington and Southern California apples.

The pectinol method of clarification has been found the most satisfactory on the whole, although an objectionable sediment formed in a few cases, especially after six months' storage. Pectinol is, of course, a pectase enzyme preparation adsorbed on a powdered vegetable material which can be added directly to the juice. The apples were pressed in the morning and enough pectinol added at noon so as to complete the enzyme action by the next morning. An average temperature of 190° C. was used as a basis for calculating the amount of pectinol necessary.

Sugar Beet

There has not yet been any official statement as to whether the findings of the majority in the Greene Committee will be accepted or whether any modifications will be made. There have, however, been some interesting statements about the present position. Thus Mr. Elliott informed Mr. Samuel that assuming the acreage under sugar beet to be 375,000 acres the cost to the taxpayer and consumer will be over 5½ millions sterling, and that will bring the total cost to over 50 millions. When one considers that according to the statement in the House by the Financial Secretary to the Treasury the estimated expenditure in the present financial year on all scientific research, including grants through the Department of Scientific and Industrial Research, the Ministry of Agriculture and Fisheries, the Colonial Development Fund, etc., is under 4 millions, the money spent on sugar beet is ridiculous.

WHAT ARE CARAMELS ?

Some Considerations from the Scientific Standpoint

By R. Harold Morgan, M.Sc.

IT IS quite evident that caramels form one of the most popular kinds of confectionery, and yet, despite the enormous tonnage annually produced, there does not appear to have been much work carried out on the fundamental constitution of these sweetmeats from the point of view of explaining vagaries in manufacture, introducing scientific control of the manufacturing processes, and developing new modifications on fundamentally sound lines.

The term caramel covers a particular type of confection which in texture and taste can exhibit some variations, and it includes many lines which to-day are sold to the public as toffee. The original form of the latter was a high boiled sweet containing fat and little, if any, milk solids, in definite contrast to the softer and more bodied caramel.

A precise definition of a substance should give not only the ingredients but also accurate information regarding the manner in which these are combined. The complex system forming a caramel has yet to be studied in further detail before a really scientific formula can be applied. Quite a lot of information has been obtained, but the sum total of our knowledge is not yet sufficient to be able to predict with certainty the practical result which will be obtained in the factory from a predetermined formula and *modus operandi*.

A definition standard suggested by the American National Confectioners' Association reads as follows:

"Caramels are confections composed of water, sucrose, lævulose, dextrose and/or maltose, and/or dextrines along with whole milk or non-fat milk solids, as they appear in whole milk, and a satisfactory fat with or without the addition of satisfactory colours and/or flavours. Consistency will vary from short and grained types to those which are chewy. Consistencies will depend upon the relative percentages of the several ingredients employed and the temperature to which such products have been cooked. Nuts, fruit and/or other satisfactory vegetable products may be employed in modified types and a satisfactory colloid may be added to obtain the desired consistency. Pulled caramels are similar to cast or cut caramels, except that they have been pulled manually or mechanically to produce the desired consistency."

It will be seen that this definition-standard, while covering in detail the ingredients of caramel, does not give much information regarding the actual physical constitution of the product. The state in which the materials exist is still a matter of speculation.

As is the case with many other industries in which scientific investigation is comparatively recent, the practice of caramel making is far in advance of theoretical explanations. Certain practical data are known as a result of many years of experience. The dextrines of glucose add "body" to the product. Milk solids impart "stand-up" qualities. Fat contributes to the richness of the flavour and is a lubricant to prevent sticking.

A Sinhalese grocer selling sweets and using a radio to attract custom, Colombo, Ceylon.

Caramel An Emulsion

One definition which has been suggested for a caramel is that it is a casein jelly, thickened by the addition of sugars, dextrine, etc., and holding in an emulsified state milk fat or other fats. The characteristic flavour is due to the burning or caramelisation of some milk product used in its manufacture and is that of slightly burnt milk and sugar.

From a consideration of the most suitable methods of making caramel, as well as microscopic and other physical tests, I am of the opinion that a caramel must be regarded as a form of emulsion in which the fat is dispersed in the sugar-glucose syrup phase. Part

of the casein acts as an emulsifying agent, while the remainder, together with most of the lactose and a little of the sugar, is suspended in the emulsion. In the ordinary way, emulsions are usually regarded as possessing some degree of fluidity, but when a high melting point fat is used quite solid emulsions are obtained. These are quite common in the cosmetic trade, for example. By dissolving sugar and glucose in the aqueous phase and emulsifying in a fat, using a small proportion of casein as a stabiliser, I have found experimentally that a still more viscous emulsion results, and this is to be expected. In other words, the "body" is increased.

The introduction of milk solids to form a suspension throughout the emulsion stiffens up and makes more rigid the emulsion texture, even by a cold mixing process, and in my experimental work quite a passable caramel was obtained in this manner. I refer, of course, only to texture and not to flavour, and the result was not strong enough for commercial purposes.

Although this laboratory experimental investigation reveals something of the emulsion make-up of a caramel, there are several points of difference in the commercial article. The effect of the heat has to be taken into consideration, and the most important result of this is the diminishing of the aqueous, or rather syrupy, phase. When dealing with emulsions I have found that the resulting texture and stability depend to a definite extent on the proportions of the aqueous and oil phases. Others interested in the preparations of emulsions no doubt will agree that maximum stability appears to be obtained with certain concentrations which vary with different oils and fats.

Stability of Emulsion

The initial essential in the successful manufacture of a caramel is to ensure thorough incorporation of the ingredients—*i.e.*, to ensure emulsification. But the subsequent stability of the emulsion is liable to be upset by the heating process, and so the initial proportions of ingredients must be balanced to allow for this diminution of the continuous phase. In the finished product we have considerably lessened proportions of the aqueous phase which by no means tends to stability. The dispersed fat considerably exceeds the amount of syrup, and, although classical instances have been given of emulsion consistency of 99 per cent. of oil dispersed in 1 per cent. of water, such examples are not necessarily commercial propositions.

The final result, then, is an emulsion of the oil-in-water type with a strong predominance of the oil phase, and this accounts for some of the trouble occasionally met with in manufacturing this class of sweet. It is quite understandable that with such an excess of fat, inversion of the emulsion to the water-in-oil type is easy, and no doubt this is the cause of fat separation which sometimes takes place either in the pan towards the finish of the boiling or after pitching on the slab. Instability is further promoted by the presence of the milk solids-not-fat in suspensions which occupy quite a considerable volume and which tend to push out the fat globules.

With ordinary emulsions of the more liquid type a heating test is often taken as a measure of their stability, and many break down under increase of temperature. Furthermore, emulsions prepared by a mixing process

An Indian confectionery stall, etc., in the Hogg Market, Calcutta.

depend on the rate of the stirring and vary much on the strength of the emulsifying agent used. The speed of the stirrers is very important in caramel manufacture. Care in pitching the boiling on to the slab has always been regarded as a practical necessity, and this is quite in accordance with our consideration of the instability of the caramel emulsion. In fact, until the boiling has "set" by cooling down, the danger of separation is always present.

Graining

Graining of caramel is another possible trouble which, from the point of view of emulsification, may be due to uneven dispersion of the fat globules (or even of the suspended solids). The aqueous phase consists of a syrup which is super-saturated on cooling, and so the natural tendency of the dissolved sugar is to come out in the form of crystals if not prevented by the dextrin of the glucose (or possibly the presence of some invert sugar) and the inhibition of nuclei formation by the dispersed phase. Anything that tends to inversion of the emulsion will cause sufficient upheaval in the system to induce such crystallisation.

In the consideration of the fundamentals of caramel I have simply regarded the basic underlying principles which apply, whatever the type of caramel produced. Manufacturers vary in their production, and caramels may be specially creamy, chewy, short, partially grained, or pulled. The emulsification principle applies in each case, and, although the nature of the desired product necessitates some adjustments in the formula or recipe, the essential balance must still be retained.

HONEY CANDY

THERE is no doubt that honey lends itself admirably to the manufacture of many kinds of novel confections which should enjoy a large measure of popularity. One of these we have already discussed in detail—namely, honey jelly—in the September, 1930, issue of this journal.

A few months ago our American contemporary, *Food Industries*, gave an article by E. F. Phillip, of the Department of Agriculture, Cornell University, on honey candy, in the course of which it was stated that a new candy combination has been perfected which not only results in an attractive confection, but also combines honey, whole milk, and milk sugar without the use of any filler, adulterant, or other questionable material. The original difficulty was that candies made with pure honey usually became so sticky in a few hours as to be unsaleable. However, a few years ago, Miss Stratton found that a small proportion of milk sugar (lactose) added to the honey caused the stickiness to disappear from the resulting candy. However, in the case of honey-lactose fondants, which are always smooth and quite soft at first, there was a tendency, due to the presence of lactose, for crystal formation to proceed after the fondant was finished, sometimes resulting in candies that were too hard. The difficulty was overcome by the addition of whole milk, which became part of the liquid phase of the fondant and tended to reduce further crystallisation.

Hard candies which do not become sticky have also been made of honey and milk sugar. In these, of course, no whole milk is added. The various formulæ have been made up into confections of different forms, from 5-cent bars to de luxe boxes containing a variety of forms and pieces. The honey fondant blends readily with almost any flavour desired, and now that whole milk is added, there is no discoloration of the chocolate coating as usually occurs when honey is used in the centres.

THE IMPERIAL INSTITUTE

ON July 4 a reception was held at the Imperial Institute in London to welcome the Delegates from the Overseas Empire Legislatures to the Conference of the Empire Parliamentary Association. Their Royal Highnesses the Duke and Duchess of York were present and the attendance was a large and brilliant one.

It is now forty-eight years since the foundation stone of the Imperial Institute was laid by Queen Victoria, and the wonderfully interesting and instructive collection of products and various forms of display illustrating the life and industries of Empire countries continues to attract visitors in ever-increasing numbers. The Imperial Institute has indeed good reason to be proud of the great work which it is carrying out to the immense benefit of every corner of the Empire.

THE LONG ASHTON RESEARCH STATION

WE have just received a copy of the Annual Report, for 1934, of the Agricultural and Horticultural Research Station (and the National Fruit and Cider Institute of the University of Bristol), situated at Long Ashton, near Bristol.

There is so much of interest and importance to the industry in this report that it would require far more space than we can devote here even to summarise in the briefest possible manner the seven papers which are published under the heading of Cider and Fruit Products. Three of these papers are by T. H. Pickford, and deal with various aspects of cider making. The other four are by Vernon L. S. Charles, two of which discuss the rôle of pectin in cider making, while the third describes experiments on the clarification of unfermented and fermented apple juice, and the fourth deals with the preservation of fruit with sulphur dioxide and the effect of hot and cold methods on residual SO_2 in jam.

Confectioners' Glucose and Dextrose

LIQUID GLUCOSE or corn syrup is a clear, bright, viscous liquid resulting from the partial hydrolysis of starch. That is to say, the product is composed of dextrose, maltose, malto-dextrines, and dextrine, but no starch. The relative proportions of dextrose, maltose, etc., can be varied according to the degree of hydrolysis, and, in fact, if this is carried to the extreme limit, commercial dextrose will be obtained.

The bulk of confectioners' glucose is produced from maize starch, although a small quantity is still made from potato starch in certain Continental countries. A sound glucose calls for an absolutely pure starch, and the maize starch used for its production is a very highly refined product.

The function of liquid glucose in confectionery is to prevent, either entirely or partially, crystallisation of sucrose. Glucose does not exert any chemical action on the sugar, but its mere presence in suitable proportions prevents the crystal lattice of the sucrose developing into crystals, which is entirely distinct from the results obtained in the old days by killing the grain with cream of tartar, whereby the production of invert sugar to the extent of from 11 to 15 per cent. was set up owing to the inversion action of the cream of tartar on the sucrose under boiling conditions. Actually, with a sound liquid glucose, not more than $3\frac{1}{2}$ per cent. of invert sugar is produced in a high boiled sweet under open boiling conditions, and, of course, less under vacuum boiling conditions.

Liquid glucose as produced in this country for the domestic trade is allowed by law to contain 450 parts per million of SO_2; usually, this figure runs to about 350 parts per million. The presence of this SO_2 tends to improve the colour of the finished boil. With a sound glucose this is not of much importance, but when SO_2 is there in the form of a bisulphite it very materially helps the keeping qualities of the resultant goods; the bisulphite acts as a buffer, thus tending to reduce inversion.

The essential points which should be possessed by a first-quality glucose are, the correct and standardised *p*H value, the reduction to a minimum of nitrogenous matters, the elimination of organic acids, and, of course, the regulation of the degree to which the hydrolysis is carried. The percentage composition of a normal glucose is: moisture, 17; dextrose, maltose, etc., 35; dextro-maltose and dextrine, 47; ash, 0·4; specific gravity, 1·426.

There are other grades of glucose available in which the relationship between dextrose and the dextrine and malto-dextrine bodies is modified to meet the particular situation.

Apart from the prevention of crystal development in high boiled goods, and its partial prevention in goods of the fondant class, liquid glucose is also used in other types of sugar confectionery for similar reasons. In table jellies, for instance, its inclusion ensures clarity in the jelly, and in jam the prevention of surface crusting—*i.e.*, the development of sucrose crystals on top of the jam in the container.

Dextrose is a true monose sugar, dextro-rotatory to polarised light, and can exist in either the hydrated or the anhydrous form. It is produced by the complete hydrolysis of starch, brought about by the action of acid under heat and pressure, the first inversion action producing over 90 per cent. dextrose expressed on the dry solids. This material is adequately neutralised, filtered, crystallised in plant of the usual sugar type, re-dissolved, again crystallised, the molasses being separated by means of centrifugals and washing. The resultant product is the hydrated form of dextrose.

The anhydrous dextrose is produced by re-dissolving this dextrose hydrate, boiling in vacuum pans, developing the grain by means of seed, and putting through centrifugals in exactly the same manner as is practised in the sugar or sucrose industry. The purity of dextrose is at least equal to the best grades of sugar.

As is well known, sucrose can be converted into invert sugar—*i.e.*, equal parts of dextrose and levulose—by suitable inversion action. Dextrose, however, cannot be inverted, and is, therefore, an absolutely stable sugar. It is less soluble than sucrose, 81 parts being soluble in 100 parts of cold water. Solutions of dextrose possess a higher osmotic pressure than similar strength solutions of sucrose, and for this reason dextrose has a higher preservative value.

Under suitable conditions, dextrose is readily crystallisable, but has the power, not of preventing, but of retarding the development of sucrose crystals; that is to say, where dextrose is present in suitable quantities with sugar, the development of the sucrose crystals will take longer than would be the case if dextrose were absent. Furthermore, dextrose not only forms in itself very small crystals, but it has also the power of reducing the size of sucrose crystals in its presence, and for this reason the inclusion of reasonably small quantities of dextrose in a fondant mixture tends to give a smoother product.

Where dextrose is used as a partial replacement for sugar in high boiled goods, the mass remains plastic for a considerably longer period than is the case with ordinary sugar boils, and for this reason it is sometimes included in casing work for satin goods, etc., a longer "pulling" period being available and a correspondingly brighter casing produced.

Dextrose has another function in confectionery, owing to the fact that it is less sweet than sugar, the relationship being in the ratio of about 66 to 100, and there appears to be a growing demand for the "medium sweet" rather than the "very sweet" confection.

The anhydrous variety of dextrose also finds a place in chocolate work, both on account of its lack of excessive sweetness and its property of lending palate smoothness.

(Courtesy of the High Commissioner for New Zealand.)

HONEY PACKING

THE PREPARATION of a clear, unclouded honey having an attractive colour and free from any sign of fermentation is a subject which is of considerable interest to confectioners, who realise full well that only correct grading and processing methods will give a pack that sells and repeats its sales. We have dealt with these matters on more than one occasion in the past, as, for example, in Professor Wilson's article which we published in the May, 1934, issue.

It goes without saying that the primary and most important requirement which the confectioner who packs honey should keep constantly in mind is that of taking every precaution to put out a product of high, uniform quality, and yet it is remarkable how little this obvious matter receives attention. Even in America, where the bulk of the honey appearing on the consumer's table is packed, not by professional honey bottlers, but as a sideline to the packaging of other food products, the industry lacks uniformity in methods and equipment, and, as remarked by Mr. N. N. Dodge, an authority on these matters, is not carried out by men who are specialists in honey. Consequently, as Mr. Dodge goes on to explain, much honey is packed with inadequate equipment and by men who are not qualified for the work. Actually, in order to build and maintain a reputation for uniform quality of a high standard, the man in charge of buying, grading, and packing the honey must be well versed, not only in the physical and chemical properties of the product, but also in its numerous varieties and flavours.

Honey Quality

Honey quality, as Mr. Dodge explained in the *Glass Packer* some two years ago, is based on three major characteristics—flavour, colour, and viscosity (density). If the product is to be packed in glass, clarity is another consideration of importance. To the housewife who places a jar of honey on the breakfast table, the presence of specks of foreign material or crystals of sugar does much to lower her opinion of the quality of the brand. Hence, a knowledge of selecting honey and of processing it to remove cloudiness, dust, and wax, and to retard granulation, is essential to the commercial honey bottler.

Flavour

Flavour is, of course, the most important element in honey quality, but, unfortunately, it seems to be a fact which is all too often overlooked that there are as many flavours of honey as there are varieties of honey-producing flowers.

Uniformity of flavour is not difficult to establish and maintain if reasonable care is devoted to selecting the honey used. It is essential that a "standard" variety be purchased, by which is meant such varieties as orange blossom, alfalfa, sweet clover, or white clover—varieties which are produced each year in large quantities.

Colour

Colour, as an indicator of true quality, is more of an artificial than an actual gauge, although in many cases it is a guide to the intensity of the flavour. To the

A New Zealand scene. Here the apiary is situated by the side of a pleasant stream in the Taranaki district.

(*Courtesy of the High Commissioner for New Zealand.*)

prospective purchaser it is, apart from the label, the only characteristic to be used as a basis for decision. The housewife must, in fact, "buy by eye". There is as much difference in the colours of honey as in the flavours; some show the "whiteness" of water, while others are as dark as molasses, with all the variations of shades between. Some persons prefer amber shades while others like the clear, white product.

In order to maintain uniformity year after year, and at the same time avoid the difficulties of too close selection, experienced packers blend their honey. In this way, by skilful combination of light and dark grades, the desired shade is obtained. Blending by flavour is practised by some expert packers who desire to tone down a flavour that is too pronounced. Blending is also a means of retarding granulation.

Granulation

Crystallisation or granulation of honey is a natural phenomenon. There are several factors that influence it. First is the variety of honey. Raspberry honey frequently crystallises within two weeks after it is removed from the comb. Honey from the sages and from tupelo sometimes will remain for years in the liquid condition. There are two simple sugars in honey, dextrose and levulose. In some honeys the proportion of dextrose is greater; these granulate readily. Honeys having a higher ratio of levulose remain liquid much longer. Fluctuating temperatures, agitation, and other factors speed up the granulation process. By blending honeys having a high levulose content with others whose excess of dextrose induces rapid granulation, the proportions of the blend are altered and granulation is retarded. Crystallisation may also be slowed up by heating honey.

A great many people think that granulation indicates that common cane sugar has been added to the honey; others believe that the honey has spoiled. The formation of crystals in a jar of honey mars the appearance, and conscientious packers prefer that no packages remain on the grocers' shelves long enough for granulation to take place. Preventing, or at least retarding, granulation is one of the packer's duties, but in many concerns

(*Courtesy of the High Commissioner for New Zealand.*)

A well-kept bee farm at Ruakura, Hamilton, New Zealand.

this problem is not understood sufficiently to permit practical application of established methods.

Viscosity

Viscosity, or density, is dependent upon the moisture content. Under normal conditions, honeys produced in semi-arid regions are viscous or heavy bodied. According to Mr. Dodge, they rarely contain more than 18 per cent. of moisture, while many of them have but 17 per cent. Honey produced in a moist climate is usually "thinner", and may contain as much as 20 or 21 per cent. moisture. Thin honey does not appeal to the consumer, and it ferments readily. Packers should exercise the greatest care in purchasing honey to make sure that it is not thin. If there is any question, a hydrometer should be used. Honey absorbs moisture from the atmosphere; hence all containers should be kept tightly sealed and in a dry place.

Clarity

Clarity is a most important characteristic for honey packed in glass. Any trace of cloudiness injures the appearance of the pack. There are two reasons for cloudiness. One is the presence of minute air bubbles. These may be removed by careful heating, straining, settling, and skimming. The other is the presence of colloids. These are also primary factors in the formation of surface foam and scum layers.

The usual method of processing consists in heat treatment, during which part of the suspended air bubbles and coarser particles tend to rise to the surface, where they form a scum which can be removed. In addition to other disadvantages, this results in very imperfect clarification, so that the honey remains distinctly turbid, and the tendency to form scum layers still exists.

An improved method was developed by R. E. Lothrop and H. S. Paine, of the Carbohydrate Division, Bureau of Chemistry and Soils, U.S. Department of Agriculture, and the suggestion was first made by them at the Cincinnati meeting of the American Chemical Society in 1930 that the clarification of honey by bentonite promises to be a valuable process for improving the quality of some low-grade honeys.

Coagulation of honey colloids can be brought about by the addition of appropriate amounts of bentonite, a colloidal clay whose particles are negatively charged. The action is one of mutual precipitation of oppositely charged colloids, and results in a brilliantly clear honey, which is lighter than the original honey in colour.

The colloidal content of honey varies between 0·1 per cent. for some light honeys and almost 1 per cent. for dark honeys (buckwheat). The colloidal particles of most honeys are positively charged, and a reversal of the charge can be brought about by increasing the *p*H of the solution. Maximum precipitation takes place when the particles show no charge (the iso-electric point), which is about *p*H 4·3. Above this value the colloidal particles are negatively charged; below it, they are positively charged.

Later, in 1934, they developed a process for rapid clarification, employing "flash" heating and pressure filtration through a frame press with diatomaceous earth as the filter medium. The former results in the minimum loss of flavour and the latter removes the suspended matter and air bubbles.

Grading samples of honey according to their colour.

Briefly stated, the honey from the melters is collected in a supply tank where the coarser particles and bubbles rise to the surface. From an outlet in the bottom of this tank the honey flows to a mixing tank, where a revolving paddle mixes the diatomaceous earth and the honey (about ½ per cent. of the former being used). The preparation of the earth and its addition to the honey have to be carried out in a special manner. After mixing the honey is pumped through an aluminium heating coil and then through a filter press.

Fermentation

This question has been fully dealt with by Professor Wilson in the article which he wrote for this journal last year.

SUGAR DRYING

—— A Study in Centrifugal Efficiency

By A. G. Arend

THE EFFICIENCY of centrifugals in the drying of sugar crystals depends on a number of factors, and there appears to be no accepted method for calculating this efficiency. True efficiency should be regarded as the percentage of the total mother liquor which has been separated from the sugar crystals at any given moment. Importance is attached to the discharge of liquor from the drain, and an apparent efficiency is sometimes calculated for each individual observation. This latter represents the percentage of the total mother liquor which has flowed from the drain during any definite period. Should the machine be run for a sufficiently long time, the true and apparent efficiencies will generally coincide, since all the separated liquor will have flowed from the drain. The apparent efficiency proves to be lower than the true efficiency at intermediate times, owing to the retention of liquor within the case of the machine. When investigating the matter mechanically, the extraction of the mother liquor from sugar crystals by means of different centrifugal machines demonstrated that, as a general rule, the period for revolving the crystals was unnecesarily long. After the liquor has been extracted from the sugar, it is whirled around inside the case. Thus the discharge from the drain of the centrifuge lags behind that of the true separation.

An observation of the flow from the drain consequently leads to the machine being run for too long a period.

The true separation of mother liquor from the sugar crystals was measured in the following manner: A series of average charges of almost equal weights of wet sugar crystals were successively introduced into the basket of the machine. The basket was then revolved for one minute for the first charge, and then stopped suddenly, allowing the liquor to flow from the drain of the machine. The liquor was then weighed or measured, the specific gravity taken, and the weight calculated. A second charge was then spun for two minutes, and the weight of the extracted liquor ascertained in the same manner. This procedure was continued, but the number of minutes was successively increased. In the case of the final charge, the centrifuge was run for some twelve minutes, and the quantity of liquor which had flowed from the drain at the end of each minute was measured.

The apparent efficiency of the centrifuge was thus calculated for comparison with that of true efficiency. The residual liquor was estimated by analysis of an average sample, after the crystals had been centrifuged for twelve minutes. A weighed sample of the sugar was then carefully heated until anhydrous, and again weighed, and the moisture computed.

The proportion of water in excess of the water of crystallisation was determined. At one time this moisture was assumed to have been a saturated solution, and consequently a definite amount of the sugar was in solution. The amount of mother liquor left in the charge of centrifuged sugar in the basket was calculated from the total weight of the saturated solution and the weight of the residual crystals in the original sample. The total liquor in the charge as introduced is obtained from the sum of the liquor removed, and the weight of the liquor left in the crystals in the basket. Accordingly, the percentage of liquor extracted could be calculated after each interval of time. An examination of the results shows that the liquor is sometimes rapidly removed from the sugar crystals, although the discharge from the centrifuge may occupy some appreciable time.

Some Practical Features

It was found that a considerable reduction of the speed of the machine failed materially to affect the final separation. In view of the comparatively long periods which it is customary to work the centrifugal, it would thus appear to be more economical, from the mechanical aspect, to revolve the basket at a lower speed. Alternatively, it might be run at the higher speed for a relatively shorter period. The influence which fine sugar particles exert is a very pronounced one.

With sugar from which all fine particles have been removed, the liquor which was extracted during the first minute of spinning the basket was not what might have been anticipated. Certain types of sugar crystals appear to adhere more tenaciously to the mother liquor, and thus the problem of acquiring the greatest efficiency devolves upon both the chemist and the engineer. With certain centrifugals, appreciable quantities of liquor were extracted during the eighth minute of the run. This class of sugar was dried more gradually, and to gain efficiency it was found necessary to allow anything up to twelve minutes to ensure satisfactory drying. There were some exceptional crystals which required much longer whizzing, and records of these were plotted on a graph for future comparison. It has been argued that different diameters will make a marked difference, but in practice this was not fully borne out.

Tests were made of two centrifugals of the same class

(*Continued on page* 286.)

The MANUFACTURE *of* MALT EXTRACT

Part II.

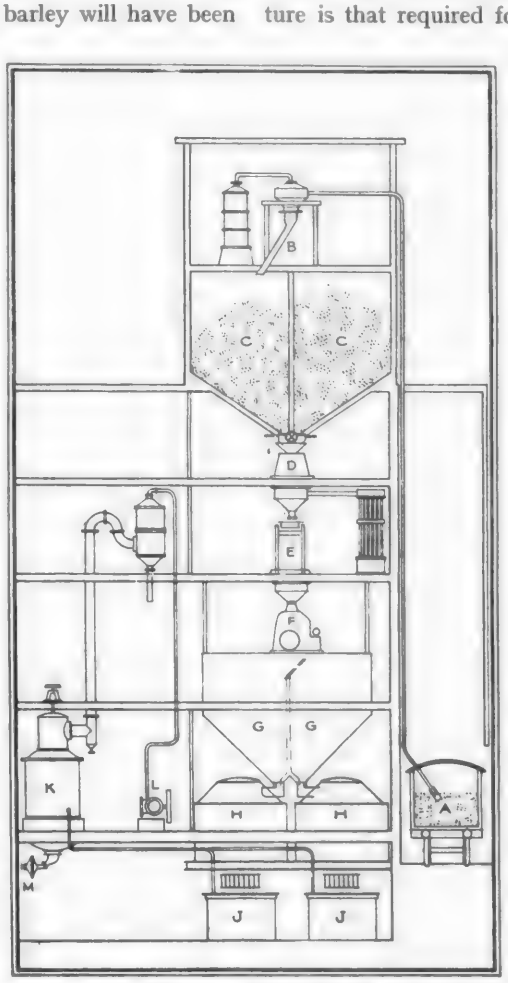
By Thomas McLachlan, A.C.G.F.C., F.I.C.

Crushing

The first step in the manufacture of malt extract, once the malt arrives at the factory, is that of crushing the malt to convert it into grist. Combined with the mill there is usually a cleaning machine to free it from dust, pieces of metal, and any other extraneous material which may be present, for although the barley will have been cleaned before the malting, in the malting process the grain goes through no machinery likely to be damaged by odd nails or stones, whereas the mill would soon suffer if these were not removed. Another object of the cleaning is to remove as many mould spores as possible, seeing that these will not be destroyed in the subsequent mashing process. The mill itself usually consists of a series of rollers adjusted at different clearances so that grains of varying size are crushed without being completely smashed, as would happen if the one clearance had to deal with all sizes, large and small. The rollers may be constructed of granite or iron and, in the latter case, are frequently grooved in order to give the grain a distinct cleft through the middle, thus opening it the better to the action of the enzymes in the wort. The grist, as it now becomes, must not be too fine, since the clarification of the wort as it runs out of the mash tun depends largely on the condition of the residual malt, or grains, for the formation of a suitable filter bed.

The Masher

The grist passes from the mill through a grist case into the masher or mashing machine, which is rather similar to a large-scale sausage-filling machine, with the exception that water may be fed into it at the same time as the grist. The temperature of the water may be adjusted by the suitable blending of a hot and cold supply, so that, when mixed with the malt, the resulting temperature is that required for the mash. In this manner no further heat should be required for the first mash. The usual proportion of malt and water is one of grist to three of water, though sometimes it is a little higher. The masher should be of such a size that the whole of the mash is fed into the tun in about fifteen to twenty minutes.



(Courtesy of Boots Pure Drug Co., Ltd.).

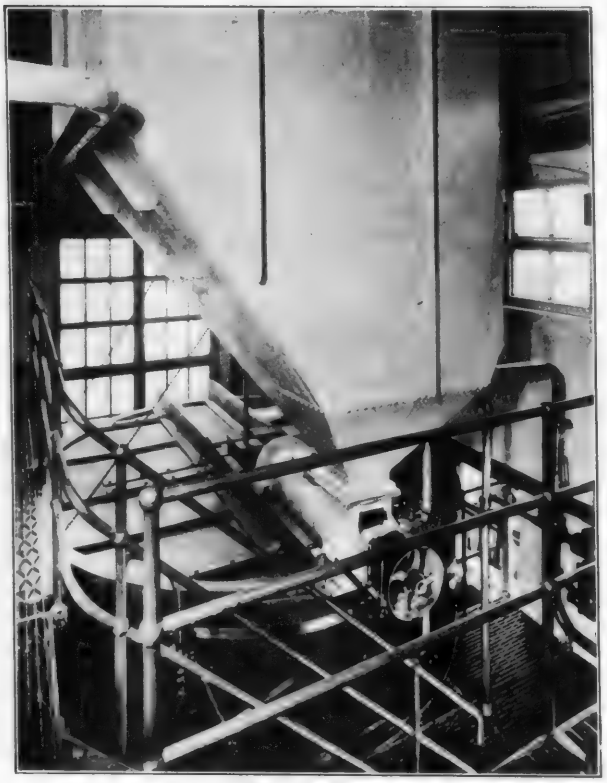
Diagrammatic Illustration of a Malt Plant.

A, Railway truck of malt grain. B, Grain suction plant for delivering malt grains to C. C, Malt grain storage hoppers. D, Automatic batch weighing machine. E, Screening machine. F, Mill for grinding the malt. G, Grist hoppers for receiving the ground malt. H, Mash tun. J, Liquor vat for receiving the wort from the mash tun. K, Vacuum pan for concentration of wort. L, Vacuum pump. M, Valve and strainer for emptying mash tun.

The Mash Tun

The mash tun consists of a wooden, or preferably copper, vat, fitted with a perforated false bottom and with metal rakes to keep the goods in motion, and also, as when changing from one temperature to another, to distribute the heat more evenly and rapidly. The mash tun should be fitted with either a fixed or movable lid in order to reduce vaporisation of the wort to a minimum and also to reduce the risk of infection from dust particles blowing about the factory. In fact, the malt extract factory should be a model of cleanliness from start to finish, with the minimum number of bacteria and mould spores in the atmosphere. The sparge is placed near the top of the tun and is so fitted that as water is fed into it to wash the grains it revolves slowly, ensuring an even distribution of sparging water over the whole surface. Just above the base

of the tun is the false bottom with large **V**-shaped slits in it which prevent the seed coats from passing through but which allow water to flow readily. This water, or wort, is collected at the base and run off through one, or sometimes two, large pipes. Between the real and false bottoms of the tun is an underlet, through which either steam or water may be admitted to the tun. The object of this is twofold, in that sometimes if a mash is sticky it may be necessary to raise the temperature in order to coagulate some of the proteins and to enable the wort to flow more freely, and at other times it may be required in order to raise the temperature of the goods, either to step the mashing process or raise the temperature for one extraction to that required for the next. It must be understood that, if the first mash is made at low temperature, the grains are not thoroughly extracted and a subsequent extraction must be made at a higher temperature if the maximum amount of extract is to be obtained from the malt.



(By courtesy of the British Dia Malt Co.)

A Mash Tun.

Conditions of Mashing

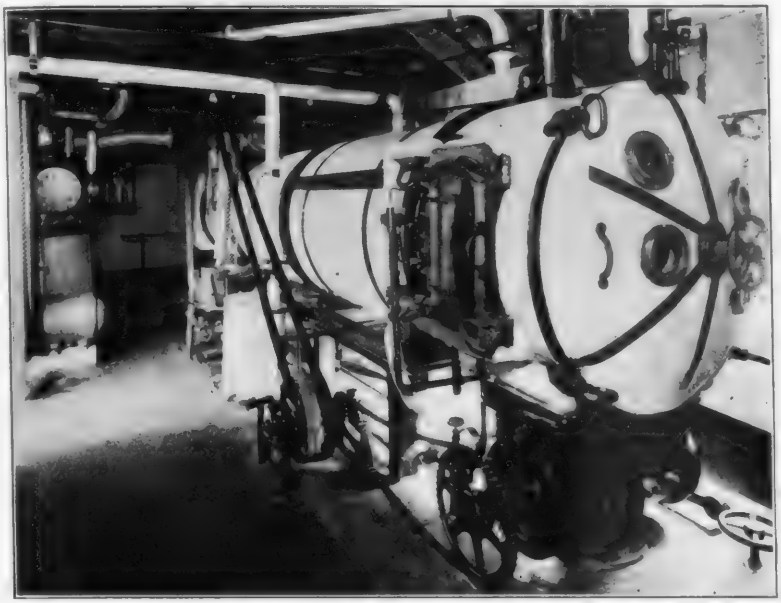
Malt may be extracted by so many processes that it is only possible to touch on them in brief. In this country, I suppose, the commonest method is to make one or more extractions of the malt, running off the separate worts and concentrating them in the vacuum pan. Thus, if the first mash be made for an hour at 30° C., the wort would be run off and the sparger started immediately so that the rate of outflow is approximately the same as the inflow. When a sufficiency of this wort has been run off the temperature is raised to that for the second extraction, and the mash continued for a second period. The temperature may be raised either by underletting with steam or by sparging with water of the required temperature. When this second mash is complete a third may be made, if necessary, but it is unusual to mash in more than two stages. For extracts for brewery, bakehouse, or textile purposes the first mash may be made at 35° to 40° C., but for pharmaceutical use or direct addition to food products it is unusual to mash below 50° C. even for the first mash, and mashing is frequently made at higher temperatures than this. The temperature of the final mash is usually between 70° and 75° C., there being no object in using more heat than this in order to exhaust the grains completely. At the same time, if there should be any residual starch left in the grains, diastase is most active at this temperature and immediate conversion would be effected. The mashing time is taken as that during which the goods are allowed to rest after being mixed or sparged and without any wort being run off. This period varies considerably according to the type of mash which is being made; for instance, a textile extract may be allowed to mash at 35° for six hours or a food extract may be mashed for half an hour to one hour only. In any case, the final mash after all preliminary worts have been run off is seldom more than about half an hour. On the Continent the step process of mashing is quite commonly practised, the method employed being to mash at a low temperature and then to run off a portion of the wort only, allowing a large amount of the initial wort to remain in the tun. The mash itself is heated to a higher temperature and allowed to continue, before drawing off a further portion of the wort. Sometimes a further mash is made before drawing off as much of the initial mash wort as possible without adding any sparge water. The last mash is then made with a final sparge.

Clarification of the Wort

In this country it does not appear to be the general principle to clarify the wort before concentration, it being considered sufficient to run the wort from the bottom of the tun and to return it to the top until it begins to run bright. At the most the wort is strained through a wire strainer. On the Continent the wort is frequently passed through a centrifuge or a filter-press, though it is difficult to state whether much is really gained by the process. It is possible that crystallisation of the extract is retarded when the initial wort is quite bright.

Concentration

The wort is almost always concentrated in ordinary vacuum pans, though multiple evaporators and film



(*By courtesy of the British Dia Malt Co.*)

A Malt Extract Drying Machine.

evaporators are now being introduced for the purpose. The extract is evaporated till the total solids are about 77 to 81 per cent. if an ordinary thick extract is required, but if a liquid extract is desired the concentration is stopped when the total solids reach about 50 per cent. For certain processes of preparing a dry extract the evaporation is also stopped when the total solids reach the neighbourhood of 50 per cent., but most extracts are brought to the thick stage before being dried.

Composition of Malt Extracts

The average composition of pharmaceutical malt extracts is shown in the following table taken from the *Analyst* (1928, p. 587):

PERCENTAGE RESULTS ON TOTAL SOLIDS

	Total Solids (Per Cent.).	*Dextrose and Lævulose.*	*Maltose.*	*Other Fermentable Sugars.*	*Dextrins.*	*Nitrogen.*
1	81·9	14·5	55·7	0·8	19·4	1·04
2	76·2	12·3	41·1	0·6	23·3	0·73
3	71·8	10·1	48·1	4·5	23·8	0·98
4	79·1	15·6	53·0	1·9	11·2	1·18
5	79·6	15·4	53·1	2·4	15·1	1·17
6	77·8	10·9	41·3	3·3	32·7	0·72
7	78·5	19·7	43·4	4·5	12·8	1·36
8	77·2	19·8	39·5	4·2	11·6	1·74
9	80·1	19·9	50·0	1·3	6·7	1·60
10	79·1	16·8	49·2	2·2	14·8	1·09
11	83·6	18·9	34·9	3·8	22·0	1·44
12	73·1	25·5	32·7	4·0	13·4	1·72

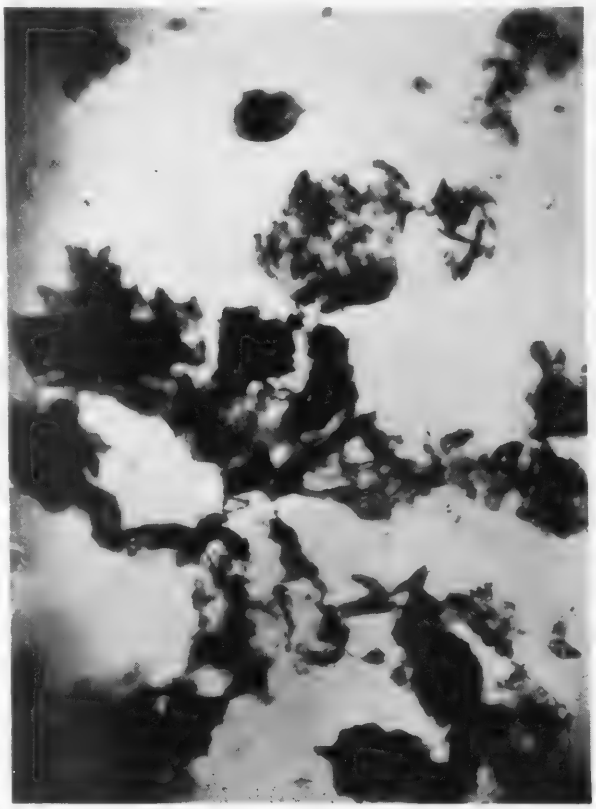
The proportion of nitrogen extracted from a malt varies considerably with different malts, but in general it may be said that a mashing temperature of about 50° is the most satisfactory if a high nitrogen content is required, and in this case about 65 per cent. of the total nitrogen in the malt may be extracted, though anything up to one-third of this may be coagulated if the wort is heated to a high temperature before or during concentration. The nitrogen distribution in an extract is usually of the following order, the results being expressed as a percentage on the total solids:

Total Nitrogen.	*Primary Proteose Nitrogen.*	*Secondary Proteose Nitrogen.*	*Peptone Nitrogen.*	*Other Nitrogen.*
1·94	0·054	0·226	0·889	0·775
1·71	0·136	0·204	0·588	0·780
1·08	0·119	0·096	0·371	0·494
1·04	0·103	0·064	0·287	0·584

From these figures it will be realised that sufficient attention is seldom given to the nitrogenous portion of a malt extract when it is desired to obtain an extract of definite characteristics, especially when it is appreciated that converted to a protein basis this may amount to from 5 to over 12 per cent. of the total solids of the extract, calculated on the dry material.

The Vitamins of Malt Extract

Malt extract has been shown to contain vitamin B, and in particular vitamin B_1, and it has been shown that as a general rule the vitamin contents run more or less parallel with the diastatic activity. This is more or less what would be expected, since heat is able to destroy either diastase or vitamin B_1. Green



Powder from Band Drier.

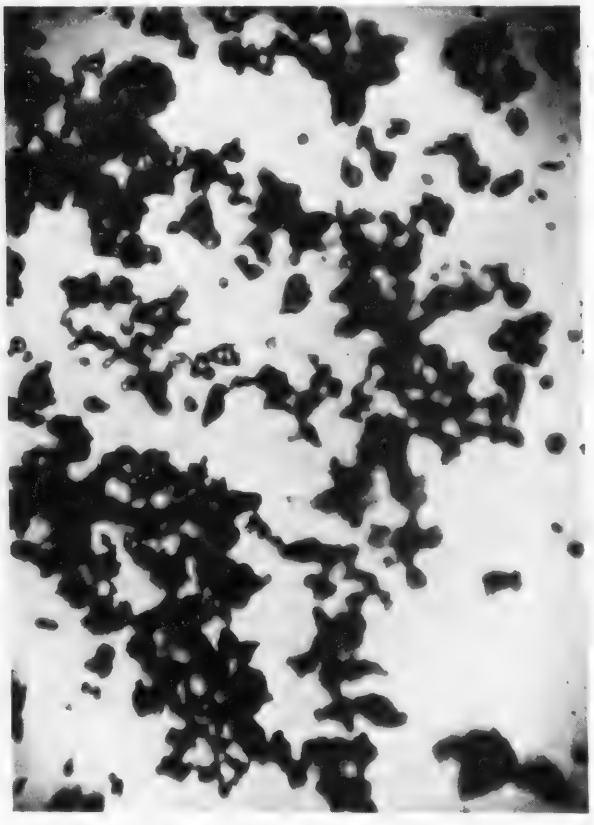
malt contains both vitamins A and C, but these are apparently destroyed during the kilning of the malt. Some extract manufacturers employ a proportion of green malt for mashing, but there does not appear to have been any considerable amount of work done to show whether extracts made from a mixed malt in this manner contain more vitamins than other extracts. In view of the apparently large amount of vitamin C present in germinating barley, one would think that it would be worth the while of manufacturers to consider whether any advantages could be gained by a more extensive use of green malt, especially as malt extract is largely used in winter months in combination with the fat-soluble vitamins or in the shape of prepared liquid foods as nightcaps before retiring.

Desiccation of Malt Extract

Increasing quantities of malt extract are being dried for various purposes. On account of the lower amounts of sugars present in textile and bakery extracts there is a greater tendency for them than for pharmaceutical extracts to ferment; consequently, unless a preservative is added, it is an advantage to dry them off completely. On account of its palatability and digestibility, increasing quantities of malt extract are being dried for food purposes, mixed with other constituents, such as milk, cocoa, and egg, and it is now being added to chocolate.

Three methods of desiccation are in common use—the vacuum oven, the band drier, and the spray drier. The vacuum oven is only suitable when the diastatic activity is a matter of no consequence, but there is no necessity to destroy much enzymic activity by either the band drier or the spray drier processes. In the band drier the extract is fed on to the band at about 75 to 80 per cent. concentration, but for spray purposes a concentration of 56 to 60 per cent. is preferable, and patents have been taken out for this concentration. It is, however, possible to dry malt extract quite easily in the spray drier, using a thick extract.

The illustrations given show the microscopic structure of three malt extracts dried by different processes—the first illustrates an extract dried by the band drier, the second an extract dried by the spray drier from a 50 per cent. extract, and the third an extract dried from a thick extract—and it is hoped that these photographs will prove of interest to my readers on account of the types obtained. In my opinion, it is preferable to employ a vacuum process if the dried extract is to be mixed with a fatty food, on account of the absence of minute air bubbles which are usually attached to spray-dried products, but the powders obtained by the spray process are preferable to handle to those resulting from the band drier, and, further, no powdering is required after using the spray, whereas the masses leaving the band drier require subsequent grinding.



Spray dried from 50 per cent. extract.

Spray dried from 80 per cent. extract.

SOYA FLOUR

—Its Manufacture and Uses

By A. A. Horvath
Newark, Delaware, U.S.A.

ONE IS entitled to question the desirability of introducing into the Western market another food material at a time when there is already a menacing overabundance of foods. The answer to this is that, while there exists a large surplus of foods rich in carbohydrates, the world of to-day is suffering from a decided shortage of edible fats and full value proteins, and that the prices for meat, eggs, milk, and butter are prohibitive to a large section of the population.

The soybean seems to be destined to fill this gap, since it contains on the average 40 per cent. of high-grade protein and 20 per cent. of oil, or double the amount compared with lean beef. To-day nearly one-half of the total population of the world are using the soybean in their daily diet, and the wisdom of this is confirmed by modern science, which has shown that:

1. The soybean protein is similar in composition and nutritive value to the proteins of meat, milk, and eggs, and is readily assimilated.
2. The soybean oil is assimilated to the extent of from 95 to 100 per cent.
3. The soybean is rich in phosphatides (lecithin and cephalin), averaging from 1·65 to 3·18 per cent.
4. The soybean is rich in vitamins A, B_1, and E, and contains also a substantial amount of vitamins D and B_2.
5. The soybean ash is rich in phosphates and is strongly alkaline.

With all these points to the credit of the soybean it seems surprising that only the last decade saw some definite steps taken to introduce whole soybean flour into the Western dietary. The main reason for such a situation was due to the fact that crude soya flour has a beany taste and deteriorates on keeping, due to the high fat content and the presence of enzymes such as lipase, oxidases, and peroxidases.

Processing

During "processing" these enzymes must be destroyed or inactivated in order to obtain a soya flour of good keeping quality. Otherwise free fatty acids are formed as well as oxyacids, nonylaldehyde, and dioxyacetone, which are toxic and possess the capacity of destroying vitamin A. After the enzymes have been properly inactivated by heat, the beans are milled and the flour obtained acquires the capacity of being stored without undergoing deterioration in spite of the 20 per cent. of oil which it contains. This phenomenon is due to the protective action of the soybean lecithin, which is known to possess antioxidant properties.

During the process of heating, connected in some patent procedures with distillation by steam or *in vacuo*, the beany tasting substances, located in the outer layers of the bean cotyledons, are volatilised, and the beans acquire a pleasant, sweet, nutty taste. The removal of the beany tasting substances seems also to enhance the keeping qualities of the soybeans, but one should not overlook the fact, pointed out by Dr. Kupelwieser, that during the process of heating the minute droplets of soybean oil are probably coated with coagulated protein, being thus partly protected from the action of oxygen.

The optimum for such a "coating" of the fat droplets is, according to Dr. Kupelwieser, a moisture content of over 10 per cent.

Whole soya flour has to be well protected from light and moisture, wax paper lined bags or metal containers being required for safe keeping, although good wooden barrels should not be excluded.

There are to-day on the market soya flours manufactured by methods where ample opportunity is given for the oxidation of the oil as well as the destruction of vitamins. Such flours have a poor taste and deteriorate further during storage. Sometimes they are mixed with cod liver oil and labelled "baby food" or blended with cocoa and vanilla flavour and sold as milk shakes.

Bread Consumption

The successful manufacture of high-grade edible soya flours nevertheless did not result in its general acceptance by the food manufacturers and the public. While the public had little knowledge regarding the virtues of whole soya flour, the wheat millers were for a time reluctant to accept it, or were even opposed to it, and this automatically was reflected in the attitude of the bakers. It was feared that the incorporation of some soya flour in wheat or rye bread meant a corresponding cut in the consumption of wheat or rye flour. This fear is unfounded. The fact is that in the Western world the con-

sumption of bread is gradually decreasing, due to a number of factors, one of them being the gradual replacement by machines of many human tasks requiring muscular exertion, thus replacing the bread fuel (starch) by coal, gasoline, and electricity. To-day's white bread, which provides mainly fuel, could be markedly improved by the incorporation of from 10 to 25 per cent. of whole soya flour, with an increase in the consumption of bread as a result.

Soya Bread

Soya flour is a highly concentrated food,* which contains no gluten and no starch, and the addition of wheat flour or rye flour in substantial proportions is required to dilute its richness as well as to make the bread balanced, capable of raising, and to give it a good texture. The following formula by Dr. J. A. LeClerc† gives good results:

Soya flour	65 g.
Wheat flour	260 ,,
Sugar	10 ,,
Salt	5 ,,
Yeast	15 ,,
Shortening	15 ,,
Water (variable)	210 c.c.

Mix three minutes; ferment at 90° F.

First punch	45 min.
To bench	15 ,,
Proof	45 ,,
Bake	30 ,,
Temperature of oven	445° F.

* If the value of soya lecithin is estimated according to the existing price for egg lecithin, 100 lb. of whole soya flour would have a lecithin value equivalent to $20.

† Senior Chemist, Food Research Division, U.S. Dep. of Agriculture, Washington, D.C.

Such a "20 per cent. soya bread" contains over 20 gm. of soya protein per pound, is equivalent in "lecithin" to one hen's egg, and is enriched in vitamins, besides having a nearly neutral ash. Wheat protein is known to be of poor quality, inadequate to sustain life in human beings. On the other hand, it was shown by nutrition experiments that for the growth of a young organism a supplementary relation exists between the proteins of white wheat flour (or rye flour) and soya flour, and that for growth a 20 per cent. soya bread is over twice as efficient as wheat bread. In addition, soya bread is more readily digested than wheat or rye bread and behaves favourably in the digestive tract, being an excellent medium for the growth of the *Acidophilus bacillus*.

Other Soya Products

For the same reason one should recommend the incorporation of 20 per cent. soya flour in macaroni, spaghetti, noodles, vermicelli, etc., as well as for coffee cakes, fig and date pudding, etc. In recent years a 7 per cent. soya flour was used by some U.S. doughnut manufacturers for their doughnuts, which are received very favourably by the public. Soya flour gives distinct advantages to these products—namely, the sweet nutty taste and the appealing golden colour, and improves through its emulsifying properties the texture and keeping qualities.

Whole soya flours, with colours of various intensities (from nearly white to deep golden), are now available, being manufactured from different varieties of soybeans,*

* Soya flour could be bleached by the enzymes which it contains (oxydases and peroxidases), but at the expense of vitamin A destruction and deterioration of fats.

(*Reproduced by courtesy of the Oxford University Press.*)

Threshing soya beans and baling the straw in England. In good drying weather the plants may be threshed on the field. Where the bean is harvested on a very large scale, bean harvesters are used. A certain amount of seed is sacrificed by this method, but this is compensated for by the saving of time and labour.

but with the spread of knowledge regarding the importance of vitamin A for health and its intimate association with the yellow colour (carotene), the taste of the public is gradually shifting from bleached products to the ones having a natural golden colour.

A 25 per cent. chocolate bar of good quality is on the market in Holland, and the idea is gaining in popularity in other countries.

(Reproduced by courtesy of the Oxford University Press.)

Harvesting soya beans in England with the reaper and binder. The plants are allowed to stand in the field until all leaves have fallen and the pods have turned colour. As soon as the pods show signs of splitting, the plants are harvested without delay, otherwise considerable loss in seed may result.

Beverages

In recent times whole soya flour has found application in the manufacture of baby foods. During the last years a variety of cocoa-malt powders containing soya flour has appeared on the American market, being mainly used as a "shake" by drug stores. The large milk distributors have realised the advantages to be derived from it, and some of them are backing these soya drink powders as a means of promoting the consumption of milk. Unblended whole soya flour can serve the same purpose by correcting certain deficiencies in milk and by rendering it much more nutritious.*

Sausages

Whole soya flour is suitable for mixing up to 50 per cent. in all kinds of sausages. It must be specially emphasised that the soya flour not only replaces the meat itself, but also absorbs a considerable amount of water. In the manufacture of sausages the soya flour is first mixed with an equal quantity of water, and then mixed with the mincemeat and made into sausages in the usual way. Sausages thus prepared are extremely nutritious and palatable and can be sold at a substantially reduced price, thus helping the meat packers to expand the volume of meat consumption by reaching customers who would not have the means to buy pure meat sausage.

Ice-Cream

The American ice-cream industry has commented favourably on the experimental incorporation of 1 per cent. of whole soya flour in ice-cream to add to its smoothness, taste, and keeping qualities. The finer the flour is milled the more pronounced is its emulsifying effect (lecithin is known to be a strong emulsifying agent). Recently, finely milled, whole soya flour is finding increasing favour in England for "cold mix" ice-cream powders, as indicated in the following formula reported in FOOD MANUFACTURE for 1934:

Sugar (finely milled)	70·0 lb.
Skim milk powder	17·5 ,,
Soya flour	7·5 ,,
Gum tragacanth	5·0 ,,
Flavour	to suit.

From $1\frac{1}{2}$ to $1\frac{3}{4}$ lb. of this mix is added to each gallon of cold milk in the "cold mix". In this instance, soya flour is replacing the expensive powdered dried egg yolk.

Nutritive Value

It is claimed that whole soya flour is non-fattening, the flour containing no starch and the oil undergoing combustion in the body instead of being deposited. It is due to the specific action of vegetable lecithin as well as to the unique property of soybean oil that unusual activity is induced in the organism without fatigue,* a property which makes soya flour highly valuable for miners, farmers, the military profession, expeditions,† sports, etc.

In order to give to whole soya flour the place in the Western world to which it is entitled, a threefold programme is necessary—namely, more fundamental scientific research on soya flour, education of soya food technologists, and education of the public. All these functions could be to a great extent the function of a National Soya Industries Research Institute, an example of which already exists in the U.S.S.R. To quote Dr. H. B. Cronshaw of this journal, "It is clear that a 'closed' policy in respect of nationally important research is not acceptable to those who desire to promote the unprejudiced distribution of knowledge among all who are likely to profit from it."

* Nutritional anæmia in rats, produced by a sole milk diet, can be cured by the addition of whole soya flour.

* Scientific experiments at the University of Yale showed that on a diet containing a high percentage of soybean oil rats were induced to exercise in revolving wheels for 10-hour periods.

† A recent Arctic expedition was using whole soya flour in the ration during a 14-month stay on the island of Jan Mayen.

BUTTER FACTORY at Battersea

Aplin & Barrett's London Works

A Corner of the Laboratory.

Above: Blended butter ready for moulding. On the right: Filling butter into cans for export.

WE HAVE been very courteously permitted to visit the factory of Aplin and Barrett, Ltd., at 33, Park Road, Battersea, London, to see the operations of butter blending and packing. It is one of the three principal works operated by the firm, the other two being situated at Yeovil in Somerset and Westbury in Wiltshire.

The "Golden Meadow" butter packed at the Battersea works is very well known. In addition to this a number of other brands and grades are marketed, such as the "Golden Mead", "Fairy Maid", "Golden Emblem", and so on. The bulk of the butter is packed in 1-lb. bricks, but a considerable amount is sent overseas packed in tins.

The laboratory is under the control of Mr. Clark, a chemist bacteriologist, who has had the advantage of considerable medical experience on the bacteriological side. The bulk of the butter received at the factory is placed in a specially equipped cold storage department, and in the factory operations it is scraped, squeezed, blended, and packed. We are permitted to reproduce a few photographs taken of the inside of the factory, and a full description and more photographs will be found in the *Food Industries Weekly* of June 28.

Sausage Rusks

By E. B. BENNION, M.Sc.
Principal of the National Bakery School, London

SINCE THE present preservatives regulations came into force many years ago there has been a great development and gradual change taking place in the method of making sausage rusks. These changes have become of more importance with the continuously increasing production of sausages in factories and their increasing consumption by the general public.

Formerly stale bread was purchased from the baker, and the sausage maker, whether factory man or local butcher, put it to soak for a definite length of time until it had absorbed a sufficiency of water. Then the surplus water was removed and the bread incorporated with the minced meat, fat, and spices. This mixture constituted sausage meat which could either be put into skins for sausages or sold for use as meat.

This method of using stale bread, however, proved too haphazard for these days of standardisation, and so the use of the sausage rusk gradually was introduced.

These rusks may be produced in either of two ways: (1) from yeast-fermented bread, or (2) from unfermented yeastless bread.

Yeast Bread Rusks

For the production of such rusks ordinary bread can be taken, and after having been sliced it must be dried. Bread used for such purposes is generally made in a three or four hour straight dough process. This drying was formerly accomplished in an ordinary oven, provided a sufficiently low temperature was obtained. Where quantity production was carried out this practice was too slow, and so it has become the practice to install a continuous drying plant fitted with a suitable exhaust to carry away the moisture. This operation should be nothing more than a removal of moisture, for it is most important that the natural white colour of the rusk should be retained and caramelisation prevented. The temperature employed in the drying plant will vary according to the type of plant, and is largely a matter to be determined by the manufacturers and users of the plant. In one type of plant the bread, when forty-eight hours old, is fed into the slicing machine, from which the slices are automatically discharged into the upper end of the cupola into which hot air is forced by a centrifugal fan.

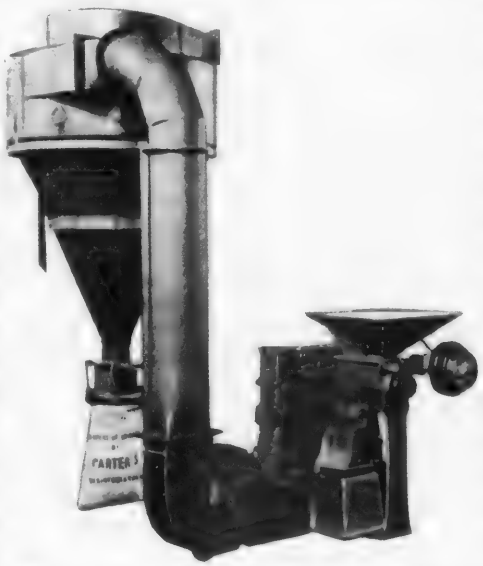


FIG. 1. — A complete grinding and collecting plant made by J. Harrison Carter, Limited. This machine comprises a grinder, a fan and a collector, from which the ground material is bagged. This plant is suitable for dealing with materials such as bread, sugar, etc.

The air heater utilises steam at a low pressure of from 10 to 20 lb. per square inch supplied from a boiler—either coke, coal, or oil fired—or from an existing installation. The condensed steam returns by gravity to the boiler. The hot dry air before escaping to the atmosphere at the upper end of the cupola comes into intimate contact with the bread and leaves the cupola in a comparatively cool condition, having given up the major portion of its heat content in extracting the moisture from the bread. The bread, when dried, passes down a chute into the crusher, from which it emerges in particles of varying fineness, and from here it passes to a grader which discharges into separate sacks. For some purposes the grading machine is dispensed with. Fig. 1 shows the complete unit and Fig. 2 the bread slicing plant. These plants are built in two sizes, in which 2 cwt. and 4 cwt. of moist bread are converted into rusks per hour and are driven by 6 b.h.p. and 10 b.h.p. motors respectively.

The operation of such a plant requires the minimum of labour and attention, and a youth is quite capable of operating it. It has the great advantage over other methods of production inasmuch as it becomes possible to produce a pure sterilised rusk, since the product is not touched by hand once the loaf is placed in the slicing machine, nor does it come into contact with atmospheric or other sources of infection.

If the complete unit is not installed, the grinding plant shown in Fig. 3 will be found most satisfactory for crushing and grading the rusks as required.

(*By courtesy of Heenan and Froude, Ltd.*)

FIG. 2.—The loaves are sliced as seen below and are introduced into such a machine before being dried and ground.

Yeastless Rusks

For the production of yeastless rusks the dough is made rather tighter than for an ordinary bread dough, and at the present time there are two methods of working.

The first method is to make a dough similar in consistency to that used for biscuits. This dough, after being thoroughly mixed and cleared, is pinned out into sheets, passing through the reduction brakes until the pieces are about three-eighths of an inch in thickness.

The dough is now cut into suitably sized pieces about 12 in. square, and after being allowed to stand for fifteen minutes to recover from the working, are baked in an oven at 450° F.

The baked pieces are then transferred to a suitable drying plant, such as has been designed for this purpose, and when the moisture content has been reduced to that found most suitable—generally from 10 to 12·5 per cent.—they are converted into rusks in the manner described above.

Biscuit Rusks

A recipe for this purpose will be along the following lines:

Flour	280 lb.
An acid phosphate powder ..	3½ ,,
Bicarbonate of soda	1¾ ,,
Salt	4 ,,
Water	from 9½ to 10½ gal.

Flour.—For this purpose the flour should not be too strong, generally a mixture of one bag of straight run flour and one bag of Australian, or two-thirds of the total flour as straight run and one-third Australian. English, French, and German flour can also be used, but the quantity of straight run should not be above two-thirds of the total amount, unless the soft flour is particularly good. The flour should never be too strong, for it is found that if too strong a flour is used the water-absorbing powers of the rusks are diminished.

Acid Constituent.—It is necessary to use a component which will produce adequate quantities of gas in the oven; generally, phosphate powders are preferred for this purpose.

Salt.—The amount of salt required is that most generally used in bread making. This not only helps to produce a better rusk by its astringent action on the gluten, but also helps to reduce souring in the soaked rusk afterwards.

Water.—The amount of water used will vary with the type of flour used, but the dough consistency to be aimed at is that normally obtained in hard biscuit doughs.

Yeastless Bread Rusks

The second method of producing yeastless rusks is to make a softer dough and bake it in the form of loaves under tins.

The same mixing would not prove suitable for this purpose, and the water content must be raised in order to produce a softer dough, which must possess spring and be capable of filling the tin during baking. In order to assist this the quantity of aerating material should also be increased, while a proportion of fat can be incorporated in the dough with advantage in order to make it more elastic.

A recipe along the following lines would prove suitable:

Flour	280 lb.
Salt	4 ,,
Cream powder	5¾ ,,
Soda	3 ,,
Neutral fat or lard	1½ ,,
Water	14 to 14½ gal.

This dough should be lightly mixed and scaled off and placed under tins. These are allowed to stand for twenty minutes, then baked in an oven at 420° F. The baking temperature must be controlled so that very little colour is obtained on the crust, for excessive crust colour will spoil the finished rusk; at the same time, it must be sufficiently high to bake the bread thoroughly. The flour used in this bread will be similar to that used for the production of the biscuits whch are crushed for rusk production.

The finished bread is allowed to stale for two days. Then it is sliced and dried in a drying plant, such as has been described, until a suitable moisture content has been obtained. The dried slices now pass to the crushing machine where the sausage rusk is obtained.

Coloured Rusks

There is an increasing demand for coloured rusks for sausage making purposes. These are pink, and for this purpose a suitable dye must be used which is fast to baking temperature and acid, or, if the medium is alkaline, as sometimes is the case in these rusks, then fast to alkali. Generally, however, the reaction is acid, for although the rusks on being soaked must keep in a sour-free condition as long as possible, it is found that if they give an alkaline reaction there is frequently a tendency for them to sour more readily.

Since these rusks are to be used as fillers in sausages, it is essential not only that they should absorb a percentage of water but that they should be capable of retaining it. Further, they should be capable of absorbing fat, so that when the sausage is cooked a uniform texture is obtained.

FIG. 3.—A bread drying machine with a capacity of 4 cwt. per hour. In this machine, bread slices are thoroughly dried by hot air before being exposed to a high temperature. Heating is effected by low pressure steam. After drying, the rusks pass down a shoot into a crusher, from which they emerge in particles of varying size. They may then be allowed to fall into a grading machine and filled into separate sacks.

For most rusks the usual test of water-absorbing power is their capability to hold twice their weight of water and, further, hold it for such a time that when mixed with the meat they will act as a binder as well as a filler.

Factors which influence the quality of a rusk are the quality and type of flour used, particularly in unfermented rusks. With fermented rusks the degree of fermentation reached is of importance, for if bread has been produced either on a long system of fermentation or from under-ripe doughs, the rusks obtained will never be as satisfactory as those produced from well-fermented short-process doughs.

Another factor is the extent to which the rusk is dried out. The moisture content of the rusk should not exceed 15 per cent. if the maximum water absorption is to be obtained.

There are other minor details of technique which all play their part and which largely depend on the care exercised in the manufacturing process.

NEW LIGHT ON MOULD GROWTH

THE CONTROL of undesirable mould growth presents very much the same problems in both food and textile industries. A paper published in the *Journal of the Textile Institute*, April, 1935, is therefore worthy of attention by those interested in the suppression of moulds on foodstuffs.

Experiments are recorded on the moisture requirements for the germination of mould spores. The spores —of various types—were exposed on thin viscose sheet kept at standard temperature and suitable humidities. As expected, considerable variation was shown in the minimum relative humidity required for growth. Many moulds—*e.g.*, *Cladosporium herbarum*—need a minimum of 90 per cent. R.H. for germination, while other common types—notably the *Aspergillus glaucus, Asp. candidus,* and *Penicillium crysogenum* groups—can germinate at 75 or 80 per cent. R.H.

Certain conclusions follow from these results. For the storage of "dry" products (those in equilibrium with their storage atmosphere) the humidity should not be allowed to rise above 70 to 75 per cent. R.H. In "plating out" mouldy products, also, it must not be too readily assumed that the most numerous and most rapidly growing types of mould were necessarily those most active under the humidity conditions of exposure. It is probable, though no experiments on this point are recorded, that the moulds with the lowest moisture requirements are also those most resistant to high osmotic concentrations—*e.g.*, strong sugar solutions.

The remaining part of the paper consists of an attempt to distinguish between the importance of moisture supplied from the atmosphere and that supplied from other sources, such as a substratum with a higher moisture regain or the extra moisture taken up by added deliquescents or hygroscopic substances. It is concluded from the results obtained that, provided the substratum is in equilibrium with the atmosphere, then the atmospheric humidity is the vital factor and not the moisture content of the substratum, and that moisture held hygroscopically is not available for mould growth.

It is shown, however, that given an atmosphere damp enough for moulds to develop, the addition of certain hygroscopic substances frequently does increase the *amount* of mould growth simply by their value as additional food material readily utilisable by mould fungi. Glycerin is one of the worst offenders in this respect, and its addition to textiles is always a source of danger. This seems curious in view of the advice frequently given to manufacturers of lemon curd, etc., to employ glycerin as a mould preventative, and a record of careful experiments in this direction would be of considerable interest.

L. D. G.

GOLF AT CARDIFF

THE Imperial Fruit Show and Canners' Exhibition will be held at Cardiff from October 25 to November 2. We are once again arranging a golf meeting, which will be held on the Tuesday, the day before the meetings start.

Eburite Corrugated Containers, Ltd., of Park Royal, have offered a challenge cup, which has been gratefully accepted on behalf of the golf circle. Mr. Norman Gold, a director of Eburite, has expressed his interest in the function and his intention to play this year. There are now two cups, each with a permanent trophy for competition, as well as, it is hoped, prizes to be won outright.

Everyone in the food trade can enter by sending in his name to "Golf", FOOD MANUFACTURE, 17, Stratford Place, London, W. 1.

FOOD TECHNOLOGY

A COURSE of instruction in Foodstuffs is to be held at the Borough Polytechnic for the benefit of men, other than technical chemists, who are engaged in the manufacture, distribution or control of foodstuffs. The lectures deal in as general a way as possible with the nature of foodstuffs and food accessories, their function in the diet, etc., and the application of principles and materials to the foodstuff industries.

This course has been found useful to food inspectors, refrigeration engineers, and distributors of foodstuffs.

The classes are to be held in the evening from 7 to 9.30, and commence on Monday, September 23, 1935.

Further particulars may be had from the Principal, Borough Polytechnic, Borough Road, S.E. 1.

Sugar Drying

(Continued from page 274.)

worked at the same speed and under the same conditions. One had a diameter twice that of the other, and the sugar was dried in practically the same time with both. The conclusions drawn from this were that the greater centrifugal force exerted by the larger centrifuge is counterbalanced by the increased resistance offered by the more tightly packed sugar crystals to the passage of the liquor. It was contended that the density of the liquor, and also whatever adhesive qualities the latter possessed for the sugar crystals, had a direct bearing on the maximum efficiency which could be secured. That is, an analysis of the liquor is necessary, since in actual practice some sugars were dried so much more rapidly than others. The practice of one sugar firm was to wash the crystals from the time they appeared to be drying up in the basket. This was done with the assistance of a common garden hose arrangement.

The small amount of sugar thus passed from the crystals into the liquor was contended to be worth the slight loss sustained, because of the time saved in the operation of the machines.

This is a view of an American research station—the laboratories of the National Canners' Association at Washington, D.C.

The TRAINING of the FOOD TECHNOLOGIST

By H. B. Cronshaw, B.A., Ph.D., A.I.C.*

(Editor-in-Chief of "Food Manufacture")

Research

IT IS now necessary to discuss the relations which exist, or should exist, between the food technologist and co-operative research, agriculture, engineering, and advertising.

The food industry, like every other industry, is largely dependent on wisely directed research for its advancement. This has been acknowledged by the provision of a number of stations at which research of a more or less fundamental character, bearing on the various branches of the food industry, is carried out. The most important ones are as follows:

Stations Controlled by the Food Investigation Board.

Low Temperature Research Station, Cambridge. (Cold storage, etc.)

Ditton Laboratory, East Malling. (Fruit storage.)

Torry Research Station, Aberdeen. (Fishery products.)

With these are associated extra-mural work conducted at the National Physical Laboratory and at the Imperial College of Science and Technology.

Other Stations.

Fruit and Vegetable Preservation Research Station, Campden. (Canning.)

Agricultural and Horticultural Research Station, Long Ashton. (Fruit products.)

British Food Manufacturers' Research Association, London. (Meat and fish.)

British Association of Research for the Cocoa, Chocolate, Sugar Confectionery and Jam Trades, London. (Confectionery.)

Flour Millers' Research Association, St. Albans. (Cereal products.)

National Institute for Research in Dairying, Shinfield. (Dairy products.)

There exist between this national system of research and the educational system which we have under discussion certain relationships which merit examination—namely, (1) the supply of adequately trained workers for the research stations, (2) the availability of the results of these researches to industry, and (3) their availability for teaching purposes.

Little need be said about the first as it is obvious that the standard of the work done at these stations is largely dependent on the previous training which the research workers have received. The stations must be able to draw upon a supply of men fully qualified to carry out their investigations. If they are not available, or if they are of indifferent quality, the standard of work turned out is bound to suffer. Industry would then consider that it had made a bad investment. Although, fortunately, those who are now employed as investigators at these stations are completely above adverse criticism, they would probably be the first to admit that they would gladly have availed themselves of a post-graduate course in food technology, had such facilities existed.

The question of the availability of the results of research to industry is a very important one. It is one with which the technologist is primarily concerned, and unless he has received an adequate training he is likely to do more harm than good. Industry cannot assimilate the results of scientific investigations without the aid of properly trained technologists. They are the enzymes, so to speak, which break down and sort out the data

* *Continued from June issue.*

supplied by the laboratory and build up the selected parts into the form best suited to the particular requirements of the industry which they serve.

The great body of data which has been accumulated at the national stations during the last few years presents an impressive sight. But, unfortunately, the eyes of the food industry are bigger than its stomach, for, owing to the lack of technological "enzymes", this research matter cannot be digested, or, at any rate, only slowly and with difficulty. No one is more aware of this than the Food Investigation Board, as is clear from the following statement made in the report for 1933:

"We recorded last year the initiation of a new series of publications in the form of leaflets, supplied gratis to applicants, and dealing briefly with practical problems of the storage and transport of foodstuffs, and the welcome which had been extended to it. We are convinced that these leaflets will play a most useful part in what is, perhaps, *the most difficult part of the Director's task —namely to secure the effective translation into commercial practice of the results of the researches carried out under his direction*, and we are sure Your Lordships will be gratified to learn that the demand for a leaflet issued during the year and entitled 'The Care of the Trawler's Fish' has already called for the distribution of some four thousand copies."

The third point for consideration—namely, the availability of the results of research for teaching purposes—does not appear to have received the attention that it deserves. From the educationalist's point of view, the national stations are of very great interest in the sense they are engaged in the production of scientific and technical data which are essential to him if he is to turn out his students fully equipped with the latest information. It is, in fact, necessary to maintain an open channel between the research stations and the centres of instruction. This means either that the results of the work carried out at all the stations are freely distributed without prejudice, or that, if this is not possible in certain instances, some special arrangement is made with regard to teachers.

In this connection one might divide the national stations into two classes, the "open" type and the "closed" type. The former includes those under the wing of the Food Investigation Board and the Long Ashton and Shinfield stations, while the latter includes the London stations of the Food Manufacturers' Federation, the canning station at Campden, and the millers' station at St. Albans. Those of the open type publish their work so as to be readily accessible to everybody; the closed stations impound the results of their work for the benefit only of those firms that contribute financial support.

Without stopping to consider whether it is morally right or wrong, practicable or impracticable, to impound for selective distribution knowledge which has been obtained partly at the expense of public funds, it is clear that a "closed" policy in respect of nationally important research is not acceptable to those who desire to promote the unprejudiced distribution of knowledge among all who are likely to profit from it. Particularly does this apply to the technological students who are about to enter the industry with the intention of bringing to bear on its practical problems the most up-to-date information that exists. If a large part of this is withheld from them, a part that is particularly valuable as it relates to just those very problems with which they will have to deal, does not this constitute a short-sighted policy on the part of industry and one which is likely to have disastrous results? Is not industry doing itself irreparable harm by sacrificing its future welfare for the sake of a temporary gain—if indeed there is any gain at all?

It would almost appear that in adopting the "closed" policy of national research we have reverted to the ways of craft secrecy, which have been shown beyond doubt to be inimical to progress.

Furthermore, it is not in keeping with the spirit of co-operative research, whose true function is to relieve individual firms of the more fundamental work which it would not be profitable for any one of them to undertake. Although necessary, work of this kind will not yield immediate benefits or tangible results commen-

This shows one of the departments in the Fruit Products Laboratory of Professor Cruess at the University of California and it illustrates the type of equipment which is provided for use of the students. On the extreme right is a glass-lined fermenting tank, followed by a brine-cooling tank, Seitz sterilising filter, counter pressure bottling machine, basket bottle rinser and sulphurising wheel. In the middle is an A.P.V. flash pasteuriser, and below it is a circular bottle pressure equalising table, together with a hand-operated capping machine on the right.

surate with their cost, and they may not be directly applicable to the operations in any particular factory. The prosecution of studies that are in the nature of specialities or company secrets can well be left to the companies themselves; they should not be matters of any concern to national or co-operative research.

Finally, reference should be made to another undesirable feature of co-operative research as it exists in this country. There is the lack of any comprehensive system designed to co-ordinate the work which is being carried on at the various stations. There is a need for planning on a broader scale, thereby linking up the different stations into one unified system, the individual members of which are controlled and operated from one central point which would be primarily concerned with matters of general policy such as the allocation of research problems, the provision of funds, the publication and dissemination of the results of work done, and so forth.

A view of the bacteriological laboratory of the National Canners' Association, where canned foods are examined and where research work bearing on canning problems is carried out. An autoclave, incubators and a glass inoculation room are shown.

Agriculture

Since the manufacturer is dependent on the grower for his supply of raw materials, just as he is dependent on the engineer for his machinery, it becomes necessary to examine the position which agriculture occupies in relation to manufacturing, with special reference to the technologist's training.

That the growing and manufacturing of foodstuffs are integral parts of a single great industrial unit needs no demonstration. Nor does the fact that the factory stands midway between the grower and the consuming public. Nevertheless, this conception has never made much headway against the traditional idea of farming as a geographically isolated and morally independent form of activity with no responsibilities beyond producing and selling as much as possible. Both manufacturer and the public have hitherto generally accepted as an "act of God" whatever the grower happened to produce. Even agricultural research has been almost wholly occupied with the problems of production. These relations are, however, undergoing a profound readjustment under the stress of forces which have come into play during the past few years.

It is becoming increasingly evident that the interest of the grower cannot terminate with the production of his crops. A more critical attitude towards foodstuffs of every kind is being displayed on the part of the public and those officials who act as guardians of the public health. There is a general movement towards commercial grades and standards and a tightening up of official supervision, even for agricultural produce which by-passes the factory direct to the consumer. This change is, of course, reflected in the manufacturer's—and the technologist's—attitude towards the grower and his products.

This attitude is coming to be dominated by two considerations: (1) the degree of freshness or state of preservation of the raw materials at the time the manufacturer commences operations upon them; and (2) the extent to which these raw materials conform with the manufacturer's particular requirements in respect of certain characteristics such as size, form, texture, colour, flavour, and so forth. Consequently it is in the manufacturer's interest to be closely associated, geographically and otherwise, with the growing activities. This leads to the ideal conception of the factory-farm—the food factory situated at the centre of the land from which its supplies are drawn. In the case of fishery products, the corresponding arrangement is the floating factory.

For example, the location of the cannery in the midst of the fruit or vegetable growing district ensures fresh materials being delivered with the minimum delay and cost to the factory. It also enables the manufacturer to exercise some measure of control over their quality in that he can apply, or experiment with, methods of crop improvement and protection. Moreover, the canning industry can operate successfully only when assured a stable source of raw materials. Thus a further advantage

of having a cannery in the area of production is the fact that it enables the "processor" to get some idea in advance of the probable yield of fruit or vegetables that will become available for his factory and also when they will be ripe. This enables him to plan a programme in advance. There might also be a labour advantage; when the fruit and vegetables have been harvested the pickers could be employed in the factory, thus avoiding seasonal unemployment.

Under ideal conditions we should have the cultivation area with a rotation of crops and a succession of fruit trees, and in the middle would be the cannery and a research laboratory. Probably there would be factories for jam making, the preparation of fruit juices, wines, and other beverages, and the sugaring of peels and fruits, and perhaps one for the drying and pickling of vegetables. Almost certainly there would be cold and gas storage facilities. At the centre of a dairying area we would have a factory for cheese making and for drying and condensing milk, and there might also be one making use of dried milk, lactose, albumin, eggs, etc., for the preparation of infant, invalid, and suchlike foods. With these activities one ought logically to link up chocolate manufacture and bacon curing, as has been done in the latter case in Denmark. We import enormous quantities of milk products and yet have a surplus of liquid milk. The factory-farm would eliminate that.

Moreover, out of this conception of "farming for industry" would arise conditions favourable for the industrial utilisation of agricultural materials other than those used for foodstuffs, such as cellulose products. In his last annual report, the Chief of the U.S. Bureau of Chemistry and Soils emphasises the possibility of developing new uses and new markets for agricultural products, particularly for surplus, culls, and waste. "There is no manufacturing industry that has the proportion of potentially valuable, poorly utilised residue that is produced by agriculture. What has been done so far is merely a beginning in the industrial use of agricultural raw materials. This is a point upon which agricultural research should be more directly centred. Farming for industry promises to be an important development of the future."

The National Canners' Association states that "The breeding of special varieties of fruits and vegetables for canning is beginning to engage the attention of specialists in horticultural science. Some of the State experiment stations are engaged in breeding new varieties of canning peas and in improving the quality of the present variety. . . . Canning is obviously an agricultural industry and is generally so recognised." Here again it is for the technologist to formulate his requirements, in this case to the grower; among the almost endless variations possible in any particular raw material, there is a combination of certain characteristics which is best adapted to his purposes.

Likewise the technologist knows the type of pig he requires to give the best bacon, just as he is aware of the desirable qualities in grain for bread, cakes, or macaroni; in pilchards for canning, in cocoa beans for chocolate, in sugar for confectionery, in oranges for marmalade, in cucumbers and onions for pickling, in cherries for cocktails, in cattle for the preparation of meat extract or corned beef, and so on. The ante-mortem history of a carcase determines its intrinsic quality and thus constitutes the most fundamental problem of the meat industry.

Since these desirable characteristics are determined before the raw material enters the factory and since they are, or will ultimately be, largely under human control, it is quite logical for the food technologist, who is responsible for the quality of the products turned out by his factory, to play some part in industrial agriculture. This does not mean to say that he should attempt to take over work which really belongs to the scientific plant or animal breeder, but that he should have had sufficient biological training to be able to co-operate with the field specialist in an intelligent fashion.

The view is therefore held that the food technologist's requirements in this connection are met by a training in general biology, unless, of course, he decides to devote himself to field work. It is even conceivable that any training in agricultural practice would be detrimental, on the principle that a knowledge of past methods is less useful than a sympathetic appreciation of new ones and the mental ability and courage necessary to have them tried out.

(*To be continued.*)

FURTHER CORRESPONDENCE

Julian S. Cohen. Coleer Citrus Products Co., New York City.

"I have noted your articles on the 'Training of the Food Technologist', and read with interest the various comments which have been made. I am wondering whether you have ever read the story of the founding of Cornell University. Mr. Cornell realised that most people do not have the financial backing to go through a long line of general education in order to prepare themselves for a specialised profession. His statement was, 'I would found a university where any man may receive instruction in any subject.' However, back of this statement he carried the idea that an education was not up to the university but up to the man, and if a man really wanted a complete education he would carry this out on his own account. With this in mind, at Cornell, the Chemistry Department attempted to give its students a very solid background in all departments of chemistry without any particular specialisation, with the feeling that the man, if he was worth anything, would apply general principles to his particular problem.

"It seems to me that this applies in the case of a food technologist, and I note that practically all of your comments have come not from the practical man in the factory, but mostly from university people who lose sight of the practical side of manufacture. When a concern, and I speak of a definite one, does a business of $1,000,000 during the year and at the end of the year comes out with a profit of $14,000, they have no money to spend on the education of their technologist, and this is the case in a great many American factories, and particularly in the preserve industry.

"I am a firm believer that the education of a man as a food technologist is entirely up to himself, and no amount of specialised training at a university is going to help him when he gets out into the competition of practical manufacture. The university can help, but the education of the food technologist is entirely up to the application of horse-sense and a desire to keep up with present developments."

INDUSTRIAL NEWS

Leipzig International Industries Fair

The Autumn Fair, 1935, will take place from August 25 to 29, with the exception of the heavy machinery and electrical engineering sections, which are not open during the Autumn Fair but only in the spring —March 1 to 8 next.

Packing machines were in considerable evidence at the last fair and showed a large increase over the display shown at the 1934 Spring Fair. There was a good demand for all these wrapping, labelling, and closing machines, etc., but it was noticeable that both home and foreign buyers displayed particularly keen interest in those machines designed for mechanically conditioning, sorting, or packing goods of industries and trades that had previously been carrying out these classes of work manually. Great interest was evinced in a parcel cording machine, and also in luminous scales in which the correct weight is indicated by large luminous figures.

Canning Publicity

An interesting effort was made the other day by Mr. Smedley in the direction of bringing home to the public the virtues of English canned peas and fruits. Representatives of the Press (including some movie men) were received first at Spalding and later in the day at Wisbech, and were shown the whole series of operations from harvesting to the despatch of the canned produce from the factory. The pea viners had started up on the previous day and were in full swing. The visitors were evidently much impressed by the up-to-date machinery, particularly at the Spalding factory, and the high pitch to which mechanical handling and automatic operations had been brought. During the lunch given by the Wisbech Produce Canners, Ltd., at Wisbech, Mr. Smedley was induced to relate his early struggles towards realising his life's ambition of establishing a great and successful industry in this country. It is a matter to be greatly wondered at that it is only fourteen years since the first factory was established at Wisbech. Since then others have been erected at Evesham, Paddock Wood, Ely, Spalding, and lastly Dundee. In the first year of the enterprise a million cans were turned out, but now the Wisbech factory turns out a quarter of a million cans a day.

The Naef Conference

An alteration has taken place in the constitution of the firm of M. Naef and Co., and the name has been changed to Chuit, Naef and Co., Firmenich and Co., Succrs. The partners are now Messrs. F., H., A. and R. Firmenich.

The conference held in Geneva at the end of June was attended by representatives from the Argentine, England, France, Germany, Italy, Portugal, and Spain and a great number of new products were discussed and the new Exaltolide plant was examined. The Chief Chemist stated that the output of Exaltolide was expected to reach a record total since the product is now being adopted by manufacturers in all countries. It was observed that the sales of Naef products showed considerable increases over those of last year. The Chairman stated that 1935 was the fortieth anniversary of the establishment of the firm.

New Creamery at Dumbarton

The Scottish Co-operative Wholesale Society, at their quarterly meeting at Glasgow on June 8, decided to proceed with the scheme for the erection of a new creamery at Dumbarton at a cost of £20,000, and also to rebuild and remodel the Society's creamery at Coatbridge.

Bakers' and Confectioners' Exhibition

The Bakers' and Confectioners' Exhibition is to be held at the Royal Agricultural Hall, London, N.1, from September 7 to 13, 1935. We have now received the Schedule of Competitions, which is divided into three sections—namely, the Bread Section, the Confectionery Section, and the Scottish Section. Information is given to competitors including the conditions which have to be complied with, entrance fee, etc. Numerous cups, medals, diplomas, and other prizes are awarded in the various sections.

B.I.F. Birmingham, 1936

The Engineering and Hardware Section of the British Industries Fair is to be held from February 17 to 28 next, to synchronise with the other sections in London. Evidently the holding of the Birmingham section of the Fair in May as this year is not considered to be satisfactory.

Applications for space are now being received and it is advisable for new exhibitors to give an early indication of provisional requirements, because applications are considered in the order received. 1935 exhibitors have an option on their sites, but provisional booking does not commit new exhibitors, though it does ensure priority. A first-class site may make a great difference to the results obtained from exhibiting at the Fair.

Mr. George Caudwell (left) and Mr. J. W. Woodrow (right) are both highly pleased with the way the peas are coming in. Mr. Caudwell is the grower and Mr. Woodrow is a director of Wisbech Produce Canners, Ltd.

Hy-Speed Labeller

An ultra-modern label paster has just been perfected by Alsop Engineering Corporation, of New York. The new machine handles labels of all sizes, shapes, and styles with maximum speed and ease. An oversize label feed table with an instantly adjustable label guide enables the operator to feed the labels into the machine with a minimum of time and effort.

There are no belts. A fully enclosed syncromesh gear drive results in smoother operation and further contributes toward making the machine positively foolproof in mechanical construction. The improved glue applicator and spreader lays a smooth, even coating of glue on the label, ensuring thorough and permanent adhesion of your labels on the containers. Where labels of different types require a glue coating of particular thickness or weight a micromatic adjustment enables you to set instantly the glue applicator to suit your immediate needs.

All parts are accessible and instantly removable for thorough washing and cleansing without undoing a single nut, bolt, or screw. The entire unit is fully enclosed, dustproof, and completely sanitary at all times. A convenient handle makes this modern unit easily portable and ready for instant action anywhere along your production line as necessity requires.

Chlorotex Reagent

The British Drug Houses, Ltd., of Graham Street, City Road, London, N. 1, have sent us a copy of their illustrated booklet entitled *B.D.H. Chlorotex Outfit*, which deals with the determination of free chlorine in drinking water and swimming pools.

By means of the D.B.H. Chlorotex Reagent it is stated that it is possible to determine easily whether the correct amount of chlorine has been used. When the reagent is added to chlorinated water it produces different colours, each of which is an indication of a definite concentration of chlorine. The booklet contains a number of excellent illustrations giving instructions for the use of the reagent.

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The partnership between H. C. Beeton and G. E. Wainwright was dissolved on June 12. H. C. Beeton has retired from the business, and "Dawn Mushroom Farms" will in future be carried on solely by G. E. Wainwright, who will be responsible for all existing debts and future purchases.

New Laboratory Stirrer

The Chemical Publishing Co., of New York, inform us of the release of a new laboratory stirrer. It is a sturdy, well-built accessory most useful for making emulsions; dissolving gums and resins, waxes and bitumins, pyroxylin, gelatin, starch, salts; extracting crude drugs and herbs, oil seeds, complex organic materials, etc.

Actuated by a shaded pole type motor it will run for 24 hours daily without change. It is non-sparking and will not be injured by fumes and vapours, while the speed may be varied as needed by the rheostat. It fits an ordinary clamp holder or may be screwed to a shelf or wall. The shaft and propeller are furnished in chromium plate or Monel, and a flexible, 6-foot rubber-covered cord and soft rubber plug are included.

The new laboratory stirrer described above. It is being offered by the Chemical Publishing Co. of New York.

Cutting Fudge by Wire

The popularity of fudge has been steadily increasing, although comparatively few manufacturers make it. This is believed to be due to the fact that the fudge which is so popular—that is, the variety without too much fat—is very difficult to cut.

It is now claimed that these difficulties have been overcome by the introduction of an apparatus employing wire as the means of cutting. The success of wire lies mainly in the fact that it presents only a very small surface to the stickiness of the sweet. Also owing to its form it has a decided tendency to polish the cut as it goes through and thereby produces an excellent finish.

As yet, it has not been found practical to apply power to these machines. As much as 10 cwt. per day can be obtained by one operator, however, as a large number of simultaneous cuts are obtained at each operation. The machine is known as the "Crematex" cutter and is made by Cerbone-Maschinen Care Riebe, Dresden A. 24, Kaitzer Strasse 42, Germany.

Jam Boiling Thermometer

The skill of the confectioner and jam manufacturer depends largely on the exact temperature used in the manufacturing processes. The ideal thermometer should therefore be very sensitive to the slightest change of temperature; accurate to the fraction of a degree; dependable at all times, and should not need constant checking with a test thermometer; safe in use, so that should it be accidently broken in handling there should be no possibility of the glass or mercury getting into the mixture; and good visibility of the reading column.

The Industrial Thermometer Company, of 83-4, Great Saffron Hill, Clerkenwell, London, E.C. 1, have recently placed on the market a jam boiling thermometer which, as far as possible, embodies all the desired features of a dependable instrument. It has a range of from 210° to 235° F., is graduated in ¼ degrees, and is very sensitive, as it will reach the boiling point of water from room temperature in less than 30 seconds. It is sturdily constructed, as the glass tube is copper plated and has a copper one-piece guard round it to protect it. The stem is made from coppered steel and the face from cast aluminium. In addition the glass tube is made from Patent Red Reading Mercury glass, which is a new invention in thermometry, as it magnifies the mercury column to show a bright red strip. This is accomplished by means of reflection. Mercury is a natural mirror, so that by placing a strip of red or coloured glass to the side of the bore or reading column and by having this bore turned to a slant, the red glass is reflected on to the mercury column, and when visioned through the lens in front of the tube only the red colour is seen.

Filter Presses

Manlove, Alliott and Co., Ltd., of Bloomsgrove Works, Nottingham, have sent us a copy of a new edition of their circular on Filter Presses. It contains a great deal of valuable and up-to-date information on the construction and operation of Filters, and is well produced on good quality art paper with numerous illustrations. Hardly any two filtration problems are exactly duplicate of one another, so that the range of modifications which may be called for is very large. The information given in this booklet as to the reasons underlying the design of the main types should therefore be very helpful. Notes are given on General De-

sign, on Operation and Handling, etc., as well as on the various types of filter presses.

The company will be pleased to forward copies to anyone interested on request.

New Fruit Grader

A new machine for the grading of plums, gages, gooseberries, etc., has been introduced by Messrs. Solignum, Ltd., of 205, Borough High Street, London, S.E. 1. The machine was exhibited at the British Industries Fair at Birmingham, and machines have already been supplied to each of the Co-operative Wholesale Society's canneries, the Mid-Sussex Canners, Messrs. Baird, Walton and May, etc.

This machine is arranged to give six grades of plums, and can be operated by hand or preferably by a belt drive from a small engine of ½ h.p. or thereabouts. The machine has a very gentle rolling action, which ensures that the fruit is turned and always graded to its shortest diameter. This gives remarkably accurate grading, and makes it ideal for the fruits in question. The grader works on a system of slats and overfeeding is impossible. The capacity of the machine is given as 1,200 lb. plums per hour, 600 lb. damsons, and 400 lbs. gooseberries, and it also has corresponding application in grading peaches, apricots, lemons, oranges, etc.

Steam Engined Cranes

An extremely well illustrated catalogue, entitled "Steam and Internal Combustion Engined Cranes", has been sent to us by Stothert and Pitt, Ltd., of Bath, England. The catalogue, which has a strong grey paper cover, is of the loose-leaf type. The pages are of art paper and each one bears an illustration of the cranes manufactured by this company at work in various parts of the world.

Various types of cranes are shown including floating cranes, steam dredging cranes, steam grabbing cranes, portable steam cranes, railway breakdown cranes, diesel caterpillar cranes, steam caterpillar cranes, magnet cranes, etc. Illustrations are also shown of other equipment for land and marine services such as concrete mixers, electric winches, oil refinery pumps, etc.

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We regret to record the death on May 30 of Mr. Arthur M. Matthews, who, until 18 months ago, was the representative of W. J. Bush and Co., Ltd., for the Midlands and Eastern Counties. In failing health for some years, he retired in October, 1933, and was an invalid until his death.

The F.W. Grader for plums, gages, gooseberries, etc. The machine works on an entirely new principle, the chief advantages of which are its accuracy and gentleness, and the fact that over-feeding is impossible.

It is also with very much regret that we announce the death of the company's North of England representative, Mr. Frank Bedding. Mr. Bedding contracted a chill whilst travelling which rapidly developed into pneumonia.

The Demonstration Canning Line

The Demonstration Canning Line absorbing fresh fruit at one end and disgorging it in cans labelled ready for the public to buy at the other was co-ordinated and carried out by Mr. G. Lowe Ponsford at the Imperial Fruit Show and Canners' Exhibition held at Leicester in November, 1934. We have now received from Mr. G. Lowe Ponsford a well produced brochure dealing with this canning line.

Considerable difficulties, including the co-ordinating of the various types and sizes of machine and the balancing of almost antagonistic interests, had to be overcome, but the scheme was successfully carried out. After carefully considering the virtues and drawbacks for canning of all possible fruits or vegetables the choice of apples was made, and to eliminate certain steam problems "apple-pie apple" or apples "quartered" in syrup was accepted as being most suitable.

The line laid down consisted of can elevators and runways, apple peelers and corers, apple seeders and slicers, filling table, automatic syruper, syrup tank and pump, exhauster (steam), double seamers (fully automatic), rotary cooker, cooler conveyor, labelling machine, boiler and accessories, and an air compressor (for control instruments).

The brochure contains much useful information for canners, and deals briefly with most aspects of the canning industry. A number of valuable hints are given, and important matters such as cooling, the boilerhouse, automatic pressure cookers, the colouring of food, etc., are dealt with. Mr. G. Lowe Ponsford will be pleased to send a copy to any canner or responsible official of any cannery who applies to him.

New Transparent Butter Wrapping

The uses of cellulose wrappings are certainly increasing every day, and now we have a new type known as Special Butter Wrapping (S.B.W.) "Cellophane" by the well-known makers. It is a vegetable product made from wood pulp, and the essential qualities claimed by the makers are moisture-proofness and high transparency and chemical purity. This paper has been specially prepared for the butter industry and is greaseproof.

The wrapping of butter in transparent paper at predetermined weights, instead of weighing it out from large quantities, would greatly reduce the collection of dirt, dust, and even germs and odours from

other foods, whilst the presentation of a butter pack showing the true colour of the butter must prove to be an added sales attraction.

S.B.W. "Cellophane" can be printed upon, if desired.

The Two-Shift System

The report has recently been published of the committee set up to enquire into the working of the temporary provisions contained in Section 2 of the Employment of Women, Young Persons, and Children Act of 1920.

A great deal of evidence was taken by the committee, including that given by the Home Office, both on the administrative and inspection sides, representatives of employers and employers' organisations, representatives of the Trades Union Congress General Council, representative women and girls actually working under the system, welfare workers, research workers, etc.

The conclusions arrived at are that the value of the system to industry for a variety of purposes has been clearly established. The evidence as to the value of the system as a normal method of industrial organisation is much less complete, but in the instances where the committee found it so used it was working satisfactorily. The committee state that they realise that "day" employment being the mode of life of the majority of the population, a system which dissociates the individual in some measure from the normal life has its disadvantages. On the general question as to whether the system should be continued on a permanent basis the committee unanimously recommended that this should be done. The committee also made recommendations as to the application of the system and the conditions under which it should be allowed.

Glaxo Laboratories

Mr. A. L. Bacharach has written us a letter in his inimical style pointing out that we have fallen into the same error as 95 per cent. of the midwives and nursing mothers who write to them by referring to the Company as "Glaxo, Limited" as we did in our Industrial News in FOOD MANUFACTURE last month. We hasten to make the correction.

The Glaxo Laboratories are moving to a new factory which is at present being built at Greenford Road, Sudbury Hill. We also assure Mr. Bacharach that we too are human, though we are not permitted, like industrial firms with their accounts, to write E. and O.E. at the end, but for the slightest error or omission are put up against the wall to be shot at.

Nil desperandum—per ardua ad astra. We shall attain Bacharachian perfection some day for we still feel very much alive.

Recording Instruments

Continuous and automatic records of manufacturing processes and the output of plants is the subject dealt with in a publication recently received from Messrs. Evershed and Vignoles, Ltd., the electrical engineers and instrument makers of Acton Lane Works, Chiswick, London, W. 4.

This 12-page booklet describes instruments by the use of which estimating and guesswork in factory management can be abolished and a record obtained showing, from minute to minute, the precise output

The front cover of the new booklet issued by Evershed and Vignoles Ltd. showing a group of many charts and part of a recording instrument. It has a background made up of the very closely printed words "Registered Trade Mark Megger" reminiscent of the body of a bankers' cheque form.

of a product or the performance of a machine. This is generously illustrated with examples of the various recording instruments which the company have perfected.

A departure from conventional catalogue product is the use of captions which are more descriptive and informative than the usual "Figure Number so-and-so." In the middle of the list a double-spread shows two close-up views of the recorder mechanism with numbered working parts, a reference table, specimen chart rulings, and an abridged specification. A striking cover design shows, on the front, a group of many charts, and on the back a facsimile chart showing three simultaneous records made by one instrument. The design has a background made up of the very closely printed words "Registered Trade Mark Megger", reminiscent of the body of a banker's cheque form, but a newcomer to an engineer's catalogue.

The Metal Box Company

The Metal Box Company was incorporated in 1921 and has an authorised share capital of over two million pounds, being a combination of the principal metal container manufacturers in Great Britain. We have recently received an interesting booklet dealing with the activities of the company and the unique service which it is able to render its customers throughout the Empire.

The booklet, which is well produced, deals briefly with the activities and products of the company. It is of cream coloured art paper with illustrations of some of the factories, studios, printing works, and machine building works on the left-hand pages and descriptive matter on the right. A short history of the company, including the more recent developments overseas, is given, and it is interesting to note that the company has nineteen factories in England, three in Africa, and two in India and employs eight thousand workers. The principal products of the company are dealt with, while research and planning, which are so necessary in a progress concern, are not forgotten.

Chains for Conveyors and Elevators

An extremely well produced and informative catalogue has been sent to us by the Renold and Coventry Chain Co., Ltd., of Renold Works, Didsbury, Manchester, dealing with their chains for conveyors and elevators.

The scope of this catalogue, which has a strong semi-stiff brown cover, has been considerably widened as compared with the last edition. It is divided into sections dealing with particular types of conveyors and elevators and makes available complete technical information for designing conveyor installations. A unique feature in conveyor practice is a selection chart to enable rapid determination of the strength of the chain required for any type of application, and also complete wheel information is given in regard to diameters and tooth forms. A number of illustrations are given at the end of the catalogue showing conveyor and elevator plant.

This excellent production appears to have achieved the company's aim, which is to make accessible the complete information to assist in the preparation of detailed conveyor schemes, and the inclusion of a separate price supplement should enable detailed estimates to be got out with a minimum of trouble.

INFORMATION and ADVICE

Sausage—Dog Biscuits—Malted Milk—Bursting Sausages —Eggs—Iodised Health Salts—Cockroaches—Preservation of Beetroot—Glacé Cherries—Mustard—Hard Candies—Fruit Preserving—Chewing Gum—Crystallisation—Suet

Sausage

1,904. *A certain proportion of the fresh pork is converted into sausage meat by us. Hitherto no preservative has been added. Now that the weather is becoming milder and warmer some preservative will be essential. We shall be most grateful for your guidance as to what is the best preservative for sausage meat.* (Lancashire.)

There should be no need to use a preservative even in warm weather, provided the meat is used fresh and is kept cool before and after chopping.

If, however, you find it necessary to use a preservative, this must be confined to sulphur dioxide, and the amount used must not exceed 450 parts per million.

1,905. *The other day we read in your paper that for examining the stability of mayonnaise a "mobilometer" is used. Could you inform us where such a mobilometer is to be had? If this instrument is not sold, could you give us particulars and a sketch of it?* (Holland.)

This information was supplied.

1,906. *In pickling silverskin onions, cauliflower, and gherkins I have a proportion of waste. Can you give me a recipe for Sweet Pickle in which these waste materials can be used up?* (England.)

The information was supplied.

Dog Biscuits

1,907. *I shall be grateful if you will be so good as to furnish me with a recipe for dog biscuits. I am not certain about the proportions of cereals and flesh foods and should like some information as to the methods of cooking.*

The main ingredient would probably be the native grown millet (eleusine), possibly with the addition of wheat meal. Dried fish or meat, mainly the offal, blood, etc., would probably be included. With regard to the meat, I would ask if this will keep in good condition after being incorporated and cooked with the other ingredients, or whether any particular steps must be taken in order to ensure it keeping. Fish, if used, would be obtained in the dried state, but meat would be bought raw. (Africa.)

The book mentioned in one of the editorial paragraphs for May should prove useful. See also previous information which we have published, such as in June, 1934.

We quoted two or three recipes by way of example in our reply to this enquirer.

The meat would, of course, have to be in a dried condition in order to resist spoilage.

1,908. *Kindly furnish a recipe for ginger marmalade.* (Middlesex.)

This was done.

Malted Milk

1,909. *Will you please give us particulars of the process of manufacture of malted milk, and particularly of how to prepare and incorporate the malt flavour?* (Lancashire.)

Details of preparation depend on the type and grade of the article you wish to prepare. You could, with some difficulty, if a thorough mixing is required, mix the dried malt extract with dried milk, but the best way is to mix malt extract with unsweetened condensed milk and then reduce to dryness. We would refer you to the manufacturers of malt extract for their advice on these points.

1,910. *We should be obliged if you could furnish us with information relative to the manufacture of a salmon paste to be put up in glass jars. We know that among your various connections such information of a reliable nature is available.* (Canada.)

An example recipe was quoted and the reader referred to a general article on fish pastes which we published in the June, 1932, issue.

Bursting Sausages

1,911. *We find sausages filled in sheep casings are easily burst when cooking. Is there any way of treating the skin in order to avoid this?* (Ireland.)

The skins should be well soaked and rubbed out before use. Damage is sometimes caused by the filling nozzle, especially if it is rather wide for the skins. It is a good plan to force a small quantity of the meat to the end of the nozzle so that it slightly projects, thus opening up the skin, and preventing it from coming into contact with the metal. A smear of sweet oil will also assist. As this type of sausage is usually filled at from twelve to sixteen to the pound, considerable allowance is necessary in order to offset the loss of capacity due to linking up.

Eggs

1,912. *We require to know the approximate proportions of egg white and yolk contained in the average hen's egg, and should appreciate your assistance on this point.* (London.)

Of course, these proportions show a certain amount of variation. Needham (*Chemical Embryology*, Vol. I, page 236) tabulates all the data available. Approximate figures (weight ratios) are: White 60 per cent., yolk 30 per cent., with shell and shell membranes making up the remaining 10 per cent. The densities of yolk and white may be taken as 1·03 and 1·04 respectively, and the water contents 48 per cent. and 88 per cent.

Iodised Health Salts

1,913. *Will you please let us know the best way of converting our Tonic Health Salts into Iodised Health Salts?* (England.)

This is a somewhat vague question, considering we know nothing whatever about the composition of your Tonic Salts. However, the following information may be of assistance:

The proportion of potassium iodide to add to "Health Salts" for general use should not exceed one part per thousand. The two formulas following may be of interest. The former is for an iodised Carlsbad Salt, and the latter for an effervescent saline powder containing iodine.

Sodium sulphate	16 lb.
Sodium carbonate	10 ,,
Sodium chloride	1 ,,
Potassium sulphate	1 oz.
Potassium iodide	190 gr.

It is customary to make a supersaturated solution of these salts in boiling water and then to crystallise, the solution being kept constantly agitated to ensure the formation of small crystals only.

Potassium iodide	120 gr.
Exsiccated magnesium sulphate ..	1 lb.
Exsiccated sodium sulphate ..	1 ,,
Sodium potassium tartrate ..	6 ,,
Potassium bitartrate	1 ,,
Sodium bicarbonate	6 ,,
Tartaric acid	2 ,,

The ingredients must be finely powdered, dried separately, and then mixed and sifted. If desired, a proportion of powdered sugar (about 6 lb.) may be added to this formula, in which case an additional 40 gr. of potassium iodide should be added. If a granular preparation is required, the following can be recommended:

Potassium iodide	80 gr.
Sodium bicarbonate	5 lb.
Tartaric acid	2½ ,,
Citric acid	2 ,,
Powdered sugar	1½ ,,

The ingredients in fine powder form should be thoroughly mixed, then placed on shallow trays which can be heated to about 100° C. The granulating mass must be kept turned over with wooden staves. When the process has proceeded sufficiently, the mass is passed through a No. 10 sieve and afterwards dried at a temperature between 50° and 55° C.

Cockroaches

1,914. *We shall be glad if you will give us any information about the manufacture of exterminating compositions for cockroaches.* (England.)

Various preparations are offered for the purpose. For instance, boric acid and borax have both been successfully used. They may be mixed with equal amounts of flour and sugar and scattered in the haunts of the insects. A borax, plaster, and pyrethrum flower mixture is also stated to give good results.

Sodium fluoride is stated to be very useful for controlling insect pests in stores and bakeries. For this purpose it may be mixed with one to three times its weight of flour, or with one part of pyrethrum powder. It has also been found very effective when mixed with meat and used as a bait for the red ant, which infests bakeries. Sodium fluosilicate is more powerful than sodium fluoride, and is used for the same purpose. It may be mixed with flour in the same way.

Preservation of Beetroot

1,915. *We cook our beetroot by steam; then slice and bottle it in ordinary strength acetic vinegar, and cap. We then place the bottles in cold water, turn on steam up to 180°, and leave for twenty minutes at this temperature. We then run the water off and leave the bottles to cool.*

We find, however, that the process has a tendency to take the colour out of the beetroot. Is there some method of preserving beetroot? (England.)

Particulars were given of the pickling process. The pickle must contain 4½ per cent. of acetic acid and about 1¼ per cent. of salt after the sliced beetroot has become saturated. The strengths of the solutions should be arranged accordingly.

Glacé Cherries

1,916. *We are about to place a contract with a new firm for the processing of our cherries. They have sent us a sample of some cherries as the old-fashioned glacé cherries, free from syrup.*

Although these are better for the cake maker, we want a bright, shiny cherry, known as a drained cherry, because most people prefer this to the one with the "candied" appearance.

We enclose a small sample of the cherries they have sent us, and should be glad if you would let us know what mistakes our friends have made and what they should do to get the cherry we want. (England.)

We think that too much sugar and not enough glucose has been used in syruping the cherries. One-third of sugar and two-thirds of glucose should be tried.

1,917. *We would be pleased if you would let us have a formula for the mixing of curry powder and one for table salt.* (Australia.)

For the former, as we have stated on several previous occasions, an addition of a small percentage of tri-calcium phosphate is made, and the details of procedure are best obtained from the suppliers of this chemical.

Suggestions were made as to the ingredients of a curry powder; but it must be remembered that considerable variations are possible.

Mustard

1,918. *We shall be pleased if you will let us know what machinery is necessary for the manufacture of mustard, and where this machinery can be purchased.* (London.)

We know of no firm specialising in this class of machinery, and it is best to put your proposition to a firm of milling engineers. The essential plant embraces two-roll grinding machines and shaking sieves, together with the usual filling and labelling machines. But the whole art of mustard preparation consists in the choice and blending of the two kinds of seed—apart from the skill in milling—and this is largely a matter of practical experience.

Hard Candies

1,919. *We note an exclusive damp-resisting ability of a sample of some English hard candies which we have standing here for quite a considerable time. We imagine this to be due solely to some chemicals.*

Now, we should very much appreciate any information you could supply in the above matter. (Riga.)

The resistance to climatic conditions does not usually depend so much on the addition of chemicals as on the balance of the recipe and the method of boiling. A certain amount of resistance is possible by the introduction of buffer salts, but their effect is not particularly beneficial in the case of high boils as in the case of crystallising syrups, etc. The finishing off and packing are important.

1,920. *Recipe required for a good, cheap tomato and fruit sauce, medium sweet. Must possess good keeping qualities and must not separate, nor congeal in neck of bottle, nor lose colour.* (Wales.)

A basic recipe with instructions was submitted.

1,921. *An enquirer had a shipment of tins of blackcurrant pulp (French) rejected by foreign port authorities, and he states: "We are quite innocent parties in the matter. We surmise that, as the goods are practically ten months old, the blackcurrant, being a very acid fruit, has played on the lacquer contained in the tins. The lacquer is always necessary in this class of tins, so as to prevent action on the tin itself."* (England.)

There is little we can say that will be useful to you, as the information given is very vague, and it is difficult to see just why the blackcurrant pulp was rejected on arrival at ——.

Blackcurrants are very acid and generally attack the lacquer. The corrosion, however, generally takes the form of pitting and the lacquer is rarely stripped off the can. It would appear that the lacquer had been stripped, in which case the lacquering must have been faulty.

We are afraid that it is not possible to give you any definite information without fuller details regarding the complaint.

Fruit Preserving

1,922. *Would you kindly furnish us with particulars of the processes and formulæ of various fruit conserves for commercial purposes?* (Kent.)

This would require a whole book. Your best plan is to secure the services of a food technologist or someone who has had the necessary practical experience.

Chewing Gum

1,923. *On a recent trip to Italy I visited a friend of mine in a sweet factory and heard of a product used in England specially for the "chewing gums". It has a green-grey colour, with a shine similar to blacklead, in small pieces, like coarse-grained granulated sugar. The goods are shipped in large wooden barrels, probably coming from England or America. This article is of great interest to me, and I should be glad if you could find out its name, characteristics, and price. A small sample would allow me to make the necessary trials.* (London.)

If it is not a variety of gum chicle we should like to see a sample for purposes of identifying it.

Crystallisation

1,924. *We are making a preparation of vegetable oil and sugar syrup. Crystallisation sets in in about two or three days. How can we eliminate that?* (Midlands.)

The information given about this preparation is not much to go on. Crystallisation only takes place from saturated solutions, and therefore one way to prevent it is to use a weaker syrup. Other ways are those used by the sugar boiler—viz., to invert a part or all of the sugar, or to use a sugar-glucose mixture, or to use all glucose. Emulsification should also inhibit crystallisation.

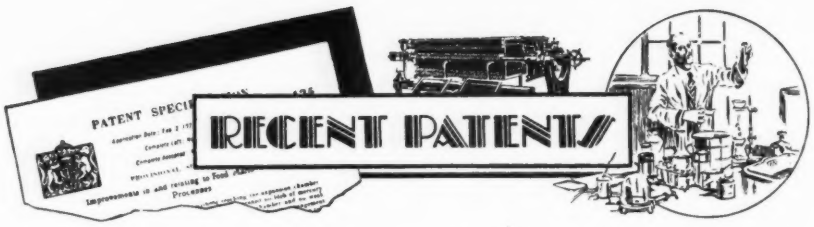
Suet

1,925. *We are manufacturers of refined beef dripping, made from fresh fat and kidney suet. We are using the —— process. We are rather perturbed because we have recently received complaints that our dripping, when it is first heated up for, say frying chips in, gives off a very unpleasant smell; this smell entirely disappears after the first cook, and we are really at a loss to account for this. Can you assist us in any way, and can you suggest any method of getting rid of this first-time odour?*

Can you advise us of a method to ensure the keeping properties of shredded beef suet? We have turned out quite a good-class product, made from fresh kidney knobs and kidney suet rendered down by our process, and the resultant shredded suet is of a very good quality, but we find that it does not keep for any length of time when done up in packets. (England.)

Assuming that the raw suet is fresh and has been properly rendered, it is difficult to account for the unpleasant smell, unless it is that the rendering plant has not been thoroughly cleaned between different batches, especially if there is an interval between each rendering operation. The best way to settle the matter is to get a food technologist to examine the process on the spot.

As regards the second part of the question, the points to bear in mind are selection of fresh material free from blood and tissue, use of dry and clean utensils, and packing in airtight containers out of contact with metal, as the latter promotes rancidity.



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

15741. BACKER, P. J. DE, and TYBERGHEIN, E. C. E.: Manufacture of coffee. May 30.
15760. INDUSTRIAL PATENTS CORPORATION. Stabilising shortening. May 30. (United States, November 12, 1934.)
15807. HUZENLAUB, E. G.: Manufacture of milk liquids. May 30.
16546. SAUNDERS, J. N.: Apparatus for storing foodstuffs, etc. June 7.
16585. KJORSTAD, E. A. H.: Preservation of food materials. June 7. (France, June 8, 1934.)
16589. LIBBY, MCNEILL AND LIBBY: Preparing food products. June 7. (United States, June 11, 1934.)
16677. DREAPER, W. P.: Preservation of food products, etc. June 8.
16767. MORRIS, S.: Manufacturing dry animal protein substances. June 11.
16774. COOK, A.: Preparation of vegetables, etc. June 11.
16856. BARUTH, K. H., BARUTH, L. L., and BARUTH, M.: Preparing tea free from theine. June 11. (Germany, June 9, 1934.)
16938. CARBOXHYD AKT.-GES.: Manufacture of saccharates. June 12. (Germany, June 14, 1934.)
17069. LIBBY, MCNEILL AND LIBBY: Producing food product. June 13. (United States, June 25, 1934.)
17070. LIBBY, MCNEILL AND LIBBY: Producing food product. June 13. (United States, April 5.) (Cognate with 17069.)
17334. STERN, E.: Starch products. June 17.
17924. GIBBONS, J. S.: Grading fruit, etc. June 21.
18132. GOELLER, K. H.: Preservation of egg yolk. June 25.
18135. MACKENZIE, J. J.: Switches for mixing foodstuffs, etc. June 25.

Complete Specifications Accepted

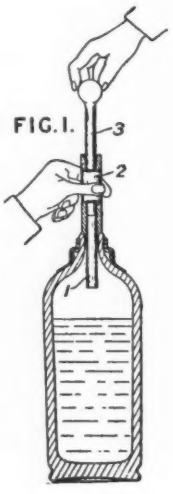
428,635. BARBIANI, A., and GIONNE, V.: Treatment of eggs.
428,740. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER: Process for decolorising sugar juices.
428,752. GÖHRING, E., and GÖHRING AND HEBENSTREIT: Machines for cutting waffles or wafers and the like.
428,775. MACFARLANE, R. F., and BAKER PERKINS, LTD.: Discharging biscuits or the like from pans or the like.
428,853. KATADYN AKT.-GES.: Method of effecting a corresponding improvement in the condition of alcoholic liquids to that normally obtained by ageing. (Cognate Application 22929/33.)
428,858. BANNISTER, A. R., DAY, F. B., and BRITISH EMULSIFIERS, LTD.: Emulsification of butter and milk for the production of artificial cream.
428,868. CHRISTIANSEN, D. M.: Production of nutrient materials. (Cognate Application 32031/33.)
429,008. HECKERMANN, H.: Preservation of eggs. (Divided out of 21394/34.)
429,040. NATURIN GES.: Manufacture of artificial sausage skins or casings. (November 28, 1932.)

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

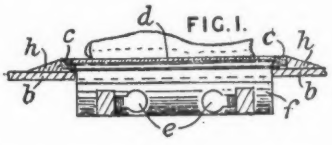
423,936. **Aerating liquids.** SPARKLETS, LTD., and CAMPBELL, R. H., Prana Works, Angel Road, Upper Edmonton, London. Group VI. Liquids such as water, lemonade, fruit juice, milk, etc., are aerated by supplying to the vessels containing them solid carbon dioxide in the form of sticks or pellets 1 kept in holders 2 formed to engage the open necks of the vessels and dislodged therefrom by means of ejectors 3. A plurality of such holders may be combined into a single element made of a suitable moulding material and having, for example, three, six, or twelve cylindrical bores arranged circumferentially to form a ring, a handle being provided for manipulative purposes. According to a modification, holders for carbon dioxide hollow, open at both ends, and of a size sufficient only for containing the requisite amount of solid carbon dioxide, may be added to the vessels and remain in them until conveniently retrievable.



423,984. **Extracting juices from fruit; graters.** FRANZE, J., 12, Weisestrasse, Neukölln, Berlin. Group VI.

A lemon or like squeezer of the kind comprising a cone having abrading ribs, is arranged for use as a grater by arranging grating-members on the internal surface of the abrading cone. As shown in the figure, the cone *e* with ribs *a* is arranged in a bowl *d* having walls extending above the level of the top of the cone, so that the device may stand inverted when used as a grater. The grating members *c* may be smooth or serrated cutting edges and may be arranged helically. They may be integral with the cone, or may be secured thereto by soldering or welding when metals are used in the construction, or they may be, as shown, separate metal strips moulded into the interior of the cone. The interior of the cone may have a cross-section different from that of the exterior. When the bowl *d* and cone *e* are of metal, the bowl may be formed with a hole in its bottom and the cone inserted therein and soldered in position. The bowl is formed with ribs or tongues forming a straining grating across the pouring spout *b*.

424,046. **Dressing fish.** NAMENDORFF, C., 8, Fruhlingstrasse, Wesermünde, Germany. Group VI.



Fish is examined for the detection of parasites and other foreign bodies by placing them on a translucent plate *d* which is illuminated from below, the parasites, etc., being removed from the fish while so illuminated. The lamps *e* are arranged within a reflector *f*, and the plate *d* is arranged in a frame *c* somewhat above the level of the bench *b*. Tapered pieces *h* are provided to effect gradual transition from the plane of the bench to that of the plate *d*. Inclined glass plates may be arranged beneath the plate *d* to deflect to the side condensation water which collects on the underside of the plate *d*. The lamps *e* may be supported on, or independently of, the reflector *f*. The switching on of the lamps may be effected by the weight of the fish acting through springs or levers. Alternatively, the lamps may be switched on and off by the hand or foot of the operator. The fish may be moved over the plate by hand or mechanically, and the plate may be inclined.

428,853. **Accelerated maturing of alcoholic liquids.** KATADYN, A.-G., Glarus, Switzerland.

In the process claimed, wines, brandies, and other beverages normally matured for many months or longer are matured with great rapidity by treatment with oligodynamic metals or their compounds, particularly silver. A contact

process may be employed in which the liquid is introduced for a short time into a vessel internally coated with the active metal and preferably filled with a large number of porcelain or the like fillings also coated with the active metal. The coatings of such fillings with oligodynamic metals has been described in the same concern's specifications Nos. 293,385 and 306,547. The alternative method utilises electrolytic action. As applied to port wine, for example, which is normally matured for several months to bring out the full aroma, an apparatus is used in the form of a cast-iron cylindrical internally rubber-coated vessel filled with a series of silver electrodes alternately connected as anode and cathode and filled with a device for occasionally reversing the polarity. Using a direct current and a potential of 1 to 1·5 volts, no electrolysis occurs. A preliminary test is required to determine the most suitable current density for maturing a particular beverage. In the present case it has been found that a total anode surface of 50 sq. cms., a current of 1 ampere, and a potential of 1·2 volts is a combination which ensures that the wine (which passes through from bottom to top of the vessel at a rate of 25 hectolitres per hour) will acquire a full mellow taste and aroma immediately after leaving the vessel. (Convention dates, Germany, August 16, 1932, and February 4, 1933.)

428,868. **Homogenised milk bakery product.** D. M. CHRISTIANSEN, Faaborg (Fünen), Denmark.

Stable products are claimed to result from addition of rennet or similar ferment to milk, homogenisation of the precipitated albumens with 1 to 6 per cent. of cream, and sterilisation in tins before sealing. Example: 100 litres skinned milk are treated at 32° C. with 30 gm. rennet, when 3,000 to 3,500 gm. of albuminous material are precipitated. Before homogenising, the precipitate is drained, washed once with skinned milk, and stirred with 10 litres skinned milk to secure improved flow. Homogenisation is then effected at 200 atmospheres and at a temperature exceeding 25° C. The product is mixed with 60 litres low fat cream (50 per cent. fat content) and re-homogenised at 60 to 70 atmospheres. After filling into containers (not quite full) fitted with loose covers, pasteurisation is carried out for 15 minutes in a waterbath at 85° C. The containers are then tightly closed by machine prior to introduction to an autoclave, where they are kept under an excess pressure of 0·6 atmosphere at 114° to 115° C. for 15 minutes. During this period they are rotated to prevent skinning, and the rotating movement is continued during cooling in the autoclave down to a temperature of 45° C. The products made up on the foregoing lines are claimed to contrast with known products, as they can be kept without separation for several months. They possess a high viscosity, white colour, and pleasant flavour without any evidence of cooking. They are suggested as a substitute for milk or cream in the production of cream sweetmeats and bakery products. (Convention dates, Germany, September 19 and 20, 1933.)

RECENT TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

"ALFA." — 556,088. **Milk.** FINDLAY MURCHIE, trading as Murchie's Creameries, Lochrin Place, Edinburgh. June 26. (Associated.) (By Consent.)

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the words "Safety First" and the device of a milk bottle.

BLUE OVAL BRAND. — 557,598. **Essences (not alcoholic) for use as food.** HAYWARD-TYLER AND CO., LTD., 97, Queen Victoria Street, London, E.C. 4. June 26.

Registration of this trade mark shall give no right to the exclusive use of the letters and abbreviations "H. T. and Co."

The trade mark is limited to the colour blue, as shown in the representation on the form of application.

BROOKE BOND TEA. — B 559,622. **Tea for export and sale abroad.** BROOKE, BOND AND CO., LTD., Calcutta House, Goulston Street, Aldgate, London, E. 1. June 26.

User claimed from October 1, 1910.

The applicants undertake that this mark, when registered, and the marks Nos. 66,341 (509), 550,852 (2666), 530,687 (2826), B 558,167 (2980), shall be assigned or transmitted only as a whole and not separately.

CO-OPERATIVE CITRUS GROWERS. — 555,989. **Citrus fruits.** CO-OPERATIVE CITRUS GROWERS' ASSOCIATION OF TRINIDAD AND TOBAGO, LTD., Port of Spain, Trinidad, British West Indies. July 10. (By Consent.)

CREAMOLA CUSTARD. — 559,409. **Custard powder.** CREAMOLA FOOD PRODUCTS, LTD., 114, Cornwall Street, Glasgow, S. 1. June 26. (Associated.)

Registration of this trade mark shall give no right to the exclusive use of the packet device.

FORTONA. — 558,671. **Biscuits.** CATER, STOFFELL AND FORT, LTD., trading also as Fortt's, 26, High Street, Bath. June 26. (Associated.)

FOUR STAR. — 559,205. **Substances used as food or as ingredients in food, but not including margarine or preparations containing cocoa, sugar, and milk in combination, and not including any goods of a like kind to any of these excluded goods.** SHAFERHAGGART, LTD., 402, West Pender Street, Vancouver, British Columbia, Canada. July 3. (By Consent.)

FOXHOUND. — 560,500. **Canned fruits, canned vegetables, canned meats, canned fish, and dried fruits.** The firm trading as C. B. LINDSAY AND CO., 4, Cullum Street, Fenchurch Street, London, E.C. 3. July 3.

FRISIA FIELDS. — 558,229. **Condensed milk, milk powder (for food), butter, and cheese.** LIJEMPF (LEEUWARDER IJS EN MELK PRODUCTEN FABRIEKEN), Naamlooze Vennootschap, Potmarge, Leeuwarden, The Netherlands. July 10. (Associated.)

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the device of cows and pastoral scene and the words "Frisia Fields".

The applicants undertake to use the mark only on goods produced in the Friesland Province of Holland.

In use upon goods other than sweetened condensed milk the mark will be varied by the substitution of the name of such goods for the words "Sweetened Condensed Milk".

FULOVIT. — 558,492. **Cereal flour.** The firm trading as WHITWORTH BROTHERS, Victoria Mills, Wellingborough, Northamptonshire. July 10. (Associated.)

GOLDEN HIND. — 557,008. **Canned grapefruit.** DAVID T. BOYD AND CO., LTD., 59, Mark Lane, London, E.C. 3. July 10.

RECENT TRADE MARKS (continued)

MELBA.—559,625. **Chocolate and cocoa.** W. S. SHUTTLEWORTH AND CO., LTD., 15, Galleywall Road, South Bermondsey, London, S.E. 16. July 3.

NEGRITA.—558,670. **Coffee for export from the United Kingdom of Great Britain and Northern Ireland, to and sale in Gibraltar.** The firm trading as B. SACARELLO, 55 and 57, Irish Town, Gibraltar. July 10. (By Consent.)

NORMANS.—558,857. **Capers, chillies, chutney, cooking fats, gelatine (for food), colouring for gravy, horse-radish powder, mincemeat, meat pastes, meat extracts, meat essences and fluid preparations of meat, preserved, canned, and bottled meats, mustard, salad and other oils for use as food, pickles, puddings, salad dressings, bacon, hams, lard and lard substitutes for food, sauces, soups, soup powders, soup tablets, and spices.** WILLIAM NORMAN JONES, Hooton Park, Cheshire. July 3. (By Consent.)

Registration of this trade mark shall give no right to the exclusive use of the word "Normans".

OLIVE LEAF.—559,510. **Flour.** JOSEPH RANK, LTD., 107, Leadenhall Street, London, E.C. 3. June 26. (By Consent.)

SILVER QUEEN. — 559,013. **Butter, cheese, margarine, lard (for food), and edible fats.** A. J. MILLS AND CO., LTD., Colonial House, Tooley Street, London, S.E. 1. May 29.

SILVER REIGN. — 559,887. **Substances used as food or as ingredients in food, but not including confectionery and not including any goods of a like kind to confectionery.** J. SMYLIE AND SONS, LTD., 2, Bury Street, Salford. June 5.

SOMERSET LAD.—559,026. **Condensed milk and milk powder for food.** EXPRESS DAIRY CO., LTD., 26, Tavistock Place, London, W.C. 1. June 26. (Associated.)

The applicants undertake to use the mark only on goods produced in Somerset.

SONATA.—559,687. **Margarine.** WESTERN MARGARINE, LTD., Alliance Factory, Western Avenue, Acton, London, W. 3. June 26. (Associated.)

SUPERIOR QUALITY.—554,654. **Milk powder (for food).** LIJEMPF (LEEUWARDER IJS EN MELK PRODUCTEN FABRIEKEN) NAAMLOOZE VENNOOTSCHAP, Potmarge, Leeuwarden (the Netherlands). June 12. (By Consent.)

TRUSTY SERVANT. — 558,304. **Flour.** JOSEPH RANK, LTD., 107, Leadenhall Street, London, E.C. 3. May 22.

TWO BEARS.—557,565. **All goods in Class 42, which includes substances used as food or as ingredients in food.** DENNIS CONNELLY, LTD., 1, West Street, London, W. 1. June 5. (Associated.)

UFFA.—559,886. **Substances used as food or as ingredients in food.** CEREBOS, LTD., Cerebos House, Victoria Road, Willesden, London, N.W. 10. May 29.

WESTILLS.—557,962. **Substances used as food or as ingredients in food.** J. B. WILLIAMS AND CO., LTD., The Quay, Gloucester. May 29.

ZARMEC.—559,871. **Substances used as food or as ingredients in food.** NATIONAL COLLEGE OF HEALTH, LTD., 208, Great Clowes Street, Broughton, Manchester. May 29.

NEW COMPANIES

AIREDALE CONFECTIONERY COMPANY, LIMITED. To carry on the bus. of mnfg. confectioners, etc. Nom. Cap.: £100. S. Milnes, of 153, Little Morton Lane, Bradford, signs as director. Sub.: E. Parkinson, 27, Duchy Grove, Bradford.

ARTHUR VALENTINE, LIMITED. To take over the bus. of a wholesale bread, cake, and confectionery maker cd. on by A. Valentine at St. Katherine Street, Northampton. Nom. Cap.: £3,000. Dirs.: A. Valentine, Daulby House, Old Duston, Northants; Wilhelmina A. Valentine, Daulby House, Old Duston, Northants.

DIRECT FOOD SUPPLY (LEEK), LIMITED. To take over the bus. of mnfg., wholesale, and retail confectioners cd. on as "Direct Food Supply" at 41, St. Edward Street, Leek. Nom. Cap.: £1,000. Dirs.: J. R. Brindley, 45, Burton Street, Leek; G. H. Ratcliffe, 35, Parker Street, Leek; F. Hambleton, 11, Nab Hill Avenue, Leek.

DOWNS ICE-CREAM COMPANY, LIMITED. To carry on the bus. of caterers, ice-cream mnfrs., etc. Nom. Cap.: £100. Subs.: C. Steel, Ronanan, The Avenue, Pinner, Middlesex, and L. J. Dowdall, 7, Dulwich Wood Road, S.E. 19.

ELIZABETH'S (FELIXSTOWE), LIMITED. 83, Hamilton Road, Felixstowe. To carry on the bus. of mnfrs. of and dlrs. in potato crisps, etc. Nom. Cap.: £600.

E. WILKINS AND SONS (CONFECTIONERS), LIMITED. 56, Station Road, Taunton, Somerset. To take over the bus. of mnfg. confectioners cd. on at 14, Station Road, Taunton, by E. Wilkins and Sons. Nom. Cap.: £100.

E. W. NOKES, LIMITED. To carry on the bus. of butchers, etc. Nom. Cap.: £3,000. Dirs.: Mrs. A. E. Nokes, 63, Gloucester Road, N. 4; E. W. E. Nokes, 62, Gloucester Road, N. 4; F. H. Nokes, address not stated; A. L. Nokes, address not stated.

GOLLAND'S, LIMITED. 146, London Road, Leicester. To carry on the bus. of chocolate mnfrs. and wholesale and retail confectioners cd. on by a company of the same name. Nom. Cap.: £3,000.

J. E. GOODWIN AND SON, LIMITED. To take over the bus. of bakers and confectioners cd. on as "J. E. Goodwin and Son" at Cheadle, Staffs. Nom. Cap.: £1,500. Permt. dirs.: J. E. Goodwin, Craigmore, Cheadle, Staffs; C. E. Goodwin, Chapel Street, Cheadle, Staffs; Evangeline Goodwin, address not stated.

L. SKAIFE (MANCHESTER), LIMITED. To carry on the bus. of packers, canners, and mnfrs. of and dlrs. in dry goods, groceries, provisions, etc. Nom. Cap.: £1,500. Dirs.: J. C. Gratrix, 8, Sunningdale Road, Urmston; T. W. Connolly, 6, Poplar Road, Kingsway, Didsbury; J. O'Connor, F. Moss, addresses not stated.

NEWLAND MARGARINE COMPANY, LIMITED. 160, Corn Exchange Buildings, Manchester, 4. To carry on the bus. of mnfrs. of and dlrs. in margarine, etc. Nom. Cap.: £500.

QUORN SPECIALITIES, LIMITED. Knighton Junction, Welford Road, Leicester. To take over the bus. of mnfrs. of and dlrs. in custards, crystal jellies, etc., cd. on at Knighton, Leicester, as the "Quorn Specialities Co." Nom. Cap.: £20,000.

SAVOURY FOODS, LIMITED. 27, Hampshire Terrace, Southsea, Hants. To carry on the bus. of mnfrs. of and dlrs. in foodstuffs, etc. Nom. Cap.: £500.

VALE OF CLWYD BUTTER FACTORY, LIMITED. To carry on the bus. of mnfrs. of butter and milk products, etc. Nom. Cap.: £1,000. Subs.: R. Edwards, Plas Llanynys, Denbigh; N. Vosper, Plas Coeh, Ruthin.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.